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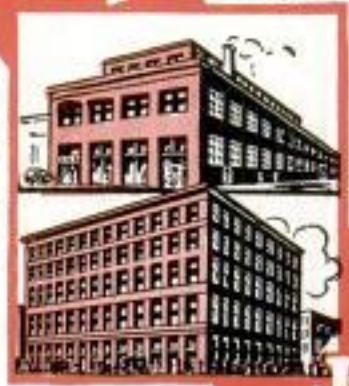

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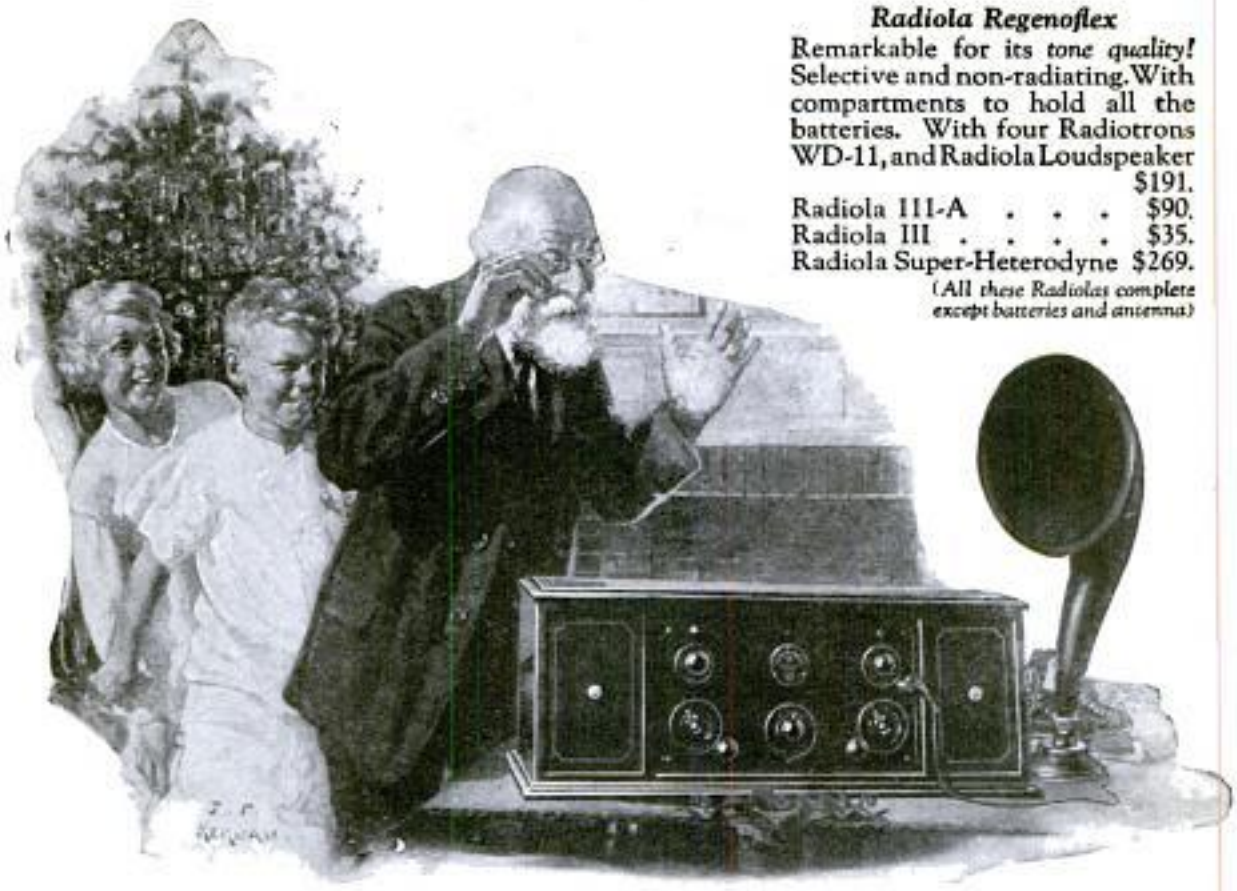

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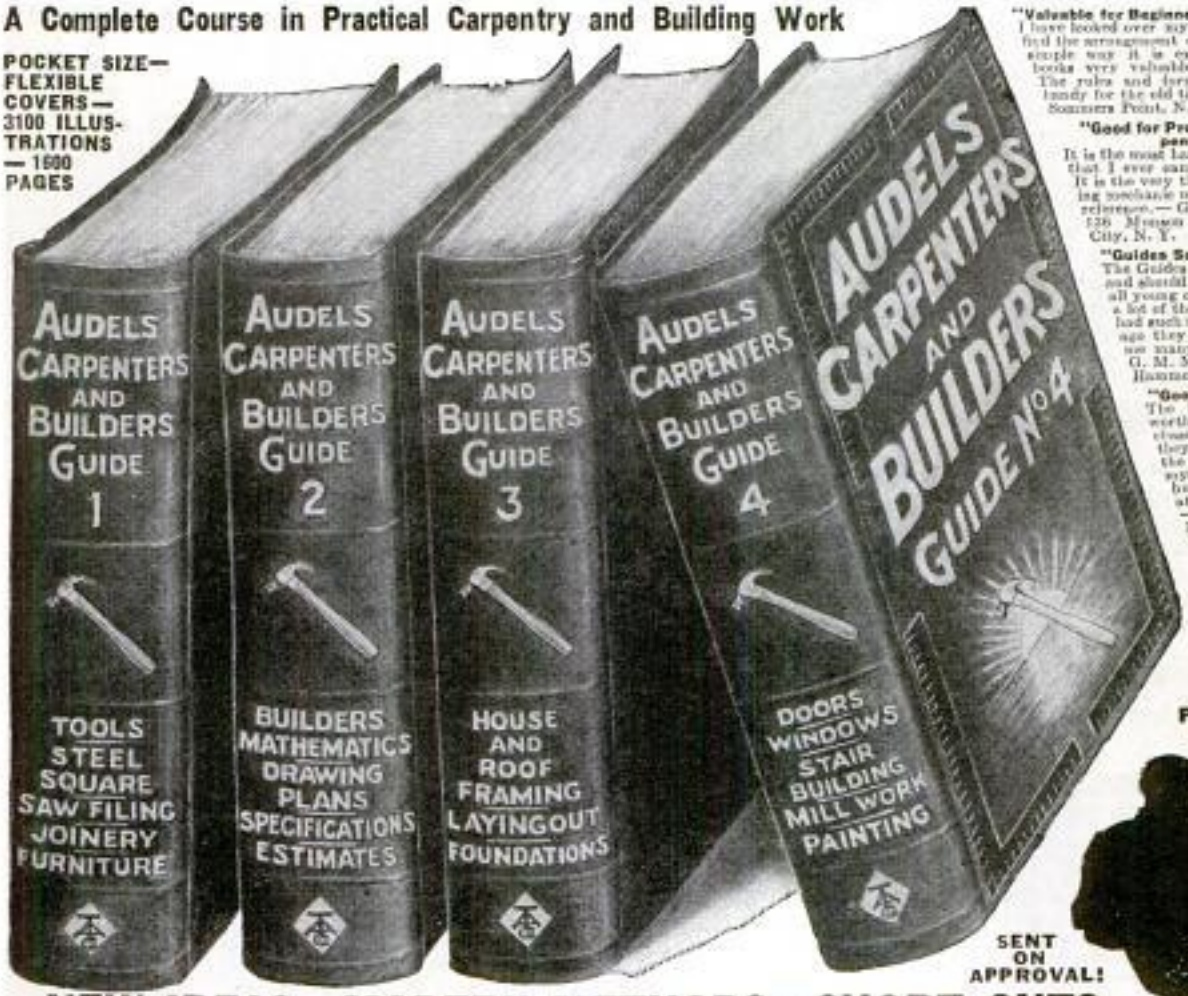

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The Guides are truly wonderful and should be in the hands of all young carpenters as well as a lot of the older heads. If I had such information 20 years ago they would have saved me many a hard knock.—C. M. McJohnston, R. R. 1, Hammond, Ind.

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The books are surely worth more than the purchase price; especially as they serve as a guide to the nonprofessional like myself who is trying to build himself a home at the least expense.—Otto F. Schulze, P. O. Box 142, Westmont, Ill.

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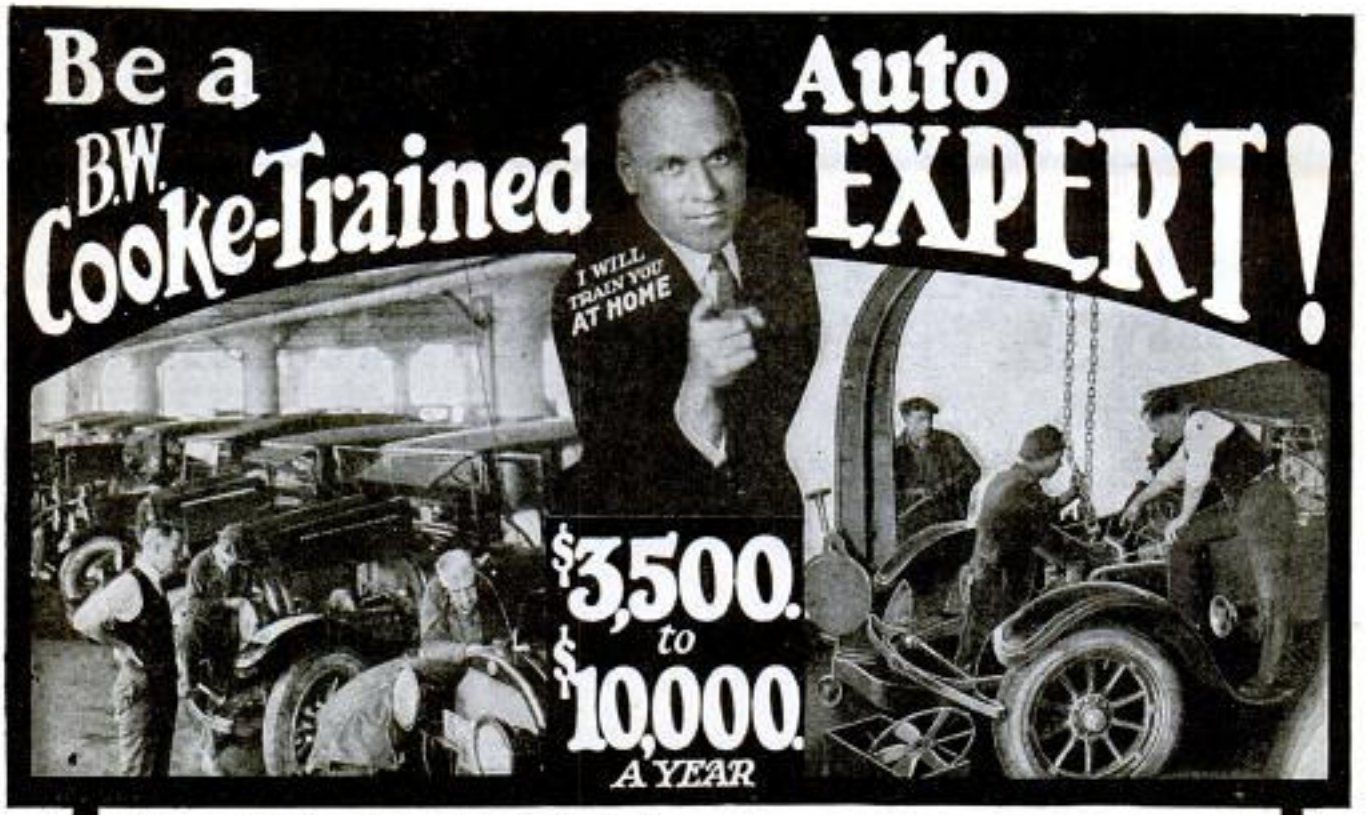
Be a B.W. Cooke-Trained Auto EXPERT!



The world's biggest, most fascinating business needs you! Why slave away at small pay when there are unlimited opportunities as a *Cooke-trained* Auto Expert waiting for you? Mail coupon and I will tell you how I train you **at home** in your spare time for AUTO EXPERTS big-pay position.

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W. J. Morriston, without previous experience—now in business for himself—and only halfway through Cooke JOB-WAY training, writes: "I would not take $500 for what I've already learned. Am already in business and clearing over $50 a week, with wonderful prospects." Hundreds others have done it. Mighty little capital needed. I'll train you, too, to do it.

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Get my big Auto Book—it's FREE—see what others have done after only a few months of my JOB-WAY training. In this book I prove to you under a written Money Back Guarantee that you will find your success as a *Cooke-trained* Auto Expert. Almost at the start I train you *to do actual jobs and make extra money doing it.* 82 out of 100 of my students report that they are doing practical work, many of them are already making more money than the entire cost of "JOB-WAY" training!

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How I Increased My Salary More Than 300%

By JOSEPH ANDERSON

I AM just the average man—twenty-eight years old, with a wife and a three-year-old youngster. I left school when I was fourteen. My parents didn't want me to do it, but I thought I knew more than they did.

I can see my father now, standing before me, pleading, threatening, coaxing me to keep on with my schooling. With tears in his eyes he told me how he had been a failure all his life because of lack of education—how the untrained man is always forced to work for a small salary—how he had hoped, yes, and prayed, that I would be a more successful man than he was.

But no! My mind was made up. I had been offered a job at $9 a week and I was going to take it.

That nine dollars looked awfully big to me. I didn't realize then, nor for years afterward, that I was being paid only for the work of my hands. My brain didn't count.

THEN one day, glancing through a magazine, I came across the story of a man just like myself. He, too, had left school when he was fourteen years of age, and had worked for years at a small salary. But he was ambitious. He decided that he would get out of the rut by training himself to become expert in some line of work.

So he got in touch with the International Correspondence Schools at Scranton and started to study in his spare time at home. It was the turn in the road for him—the beginning of his success.

Most stories like that tell of the presidents of great institutions who are earning $25,000 and $50,000 a year. Those stories frighten me. I don't think I could ever earn that much. But this story told of a man who, through spare-time study, lifted himself from $25 to $75 a week. It made an impression on me because it talked in terms I could understand. It seemed reasonable to suppose that I could do as well.

I tell you it didn't take me long that time to mark and send in that familiar coupon. Information regarding the Course I had marked came back by return mail. I found it wasn't too late to make up the education I had denied myself as a boy.

I was surprised to find out how fascinating a home-study course could be. The I. C. S. worked with me every hour I had to spare. I felt myself growing. I knew there was a bigger job waiting for me somewhere.

Four months after I enrolled my employer came to me and told me that he always gave preference to men who studied their jobs—and that my next salary envelope would show how much he thought of the improvement in my work.

Today, my salary is more than 300% greater than it was when I began my studies. That increase has meant a better home and all the luxuries that make life worth while.

What I have done, you can do. For I am just an average man. I had no more education to begin with than you have—perhaps not as much. The only difference is a matter of training and a resolve to be like Lincoln, who said—"I will study and get ready and some time my chance will come."

TO every man who is earning less than $75 a week, I say simply this:—*Find out what the I. C. S. can do for you!*

It will take only a minute of your time to mark and mail the coupon. But that one simple act may change your whole life.

If I hadn't taken that first step four years ago I wouldn't be writing this message to you today! No, and I wouldn't be earning anywhere near $75 a week, either!

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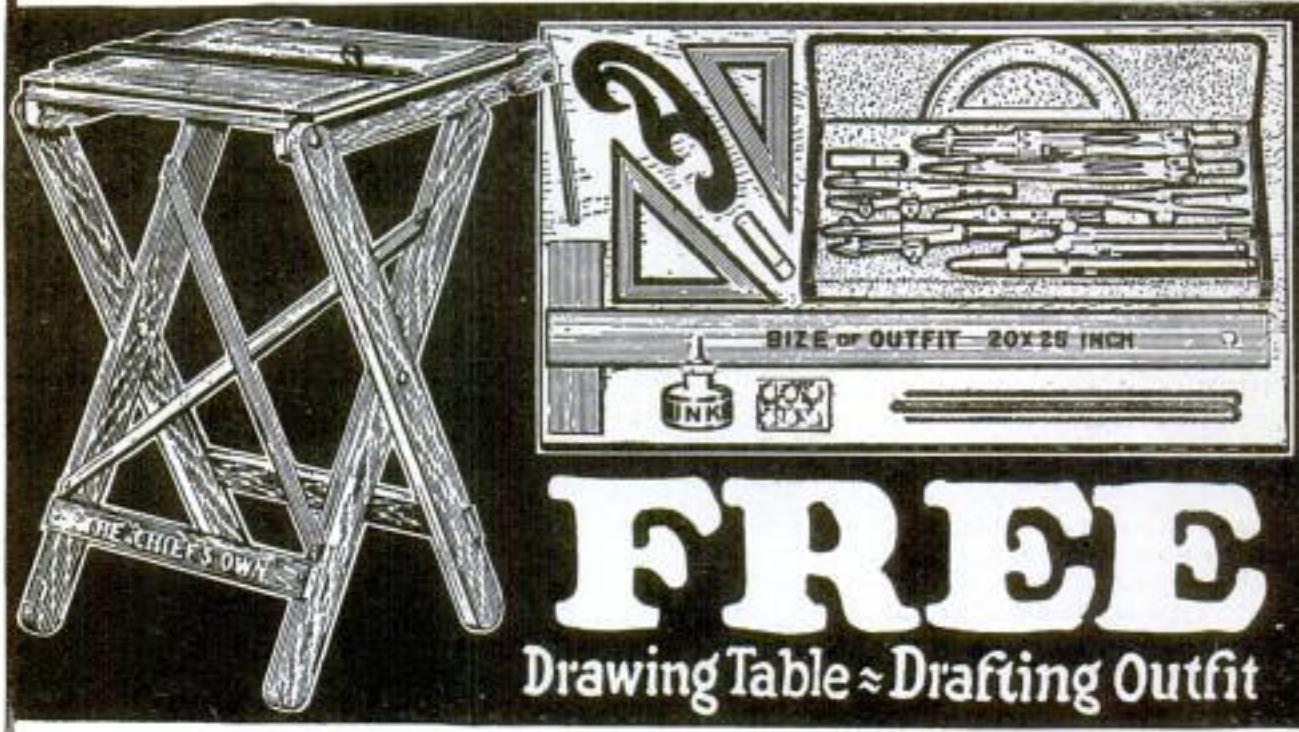

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Salaries Up to $250 and $300 a Month

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to train you until you are holding a permanent position paying you a salary of at least $250 a month. I can make this guarantee because I limit and select my students. I know that the men I take in as students, if they will follow my practical instruction, are certain to land a big money-earning job. You see I don't give you just a "Course in Drafting" and then let you shift for yourself. I watch you and help you and train you until you actually *do* get the big job. So write me today for my free book, "Successful Draftsmanship." It's FREE.

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The coupon shown or a postcard or letter will bring my book telling you all about the career of a draftsman and all about other very exceptional offers I am making, such as, for instance, a fine folding drafting table which I am giving now to my students. Write at once!

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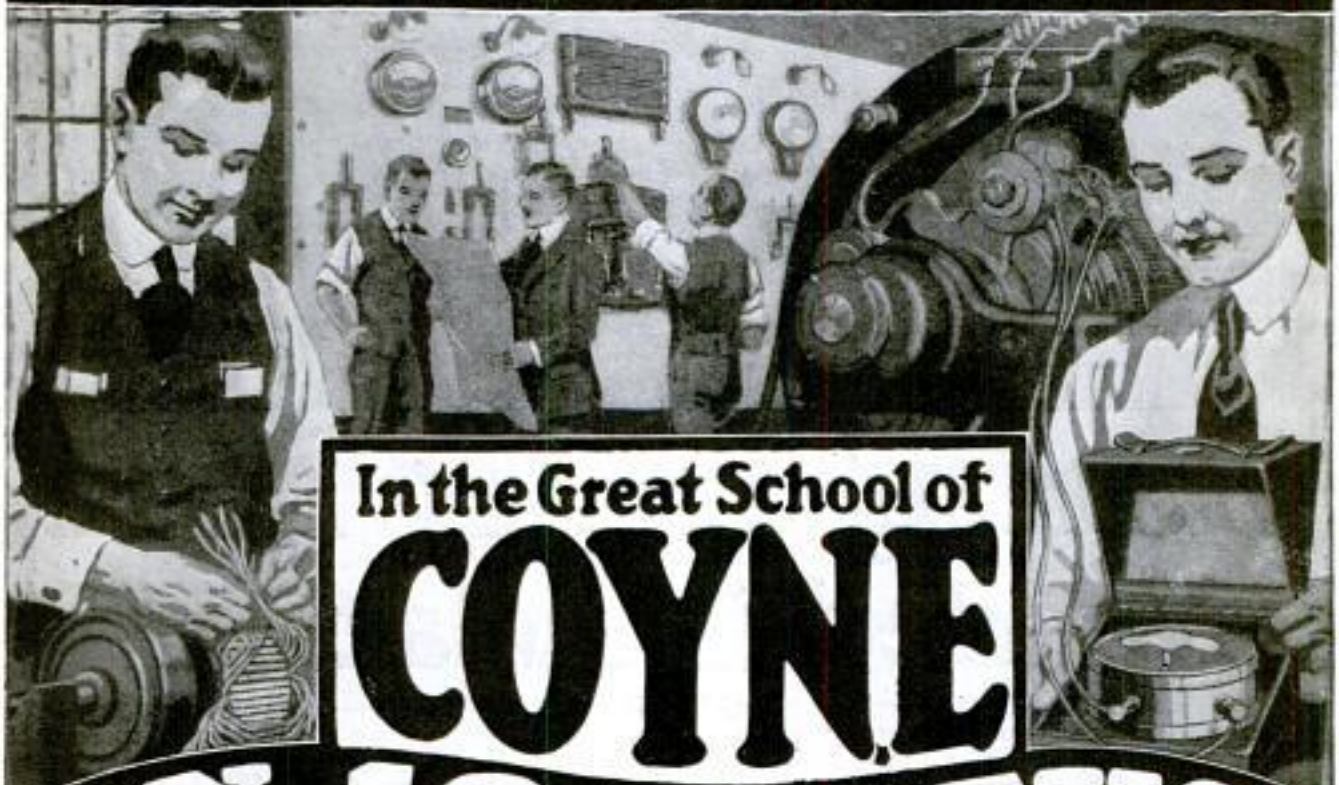

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You don't need a lot of schooling to master my course. You don't have to be a high school graduate or even a grammar school graduate. My method of instruction is clear and plain, and yet thorough, and if you can understand plain English I will make you an electrical expert even though you haven't a lot of education or any previous electrical experience.

Coyne Trains You for Life

You get a free life scholarship which enables you to stay longer than the required time if you care to, or you may return at any time to take up new work I am constantly adding to my school to make it the most modern at all times.

Earn While You Learn

My employment department will assist you to a part time job where you can make a good part of your living expenses while training, and they will assist you to get a BIG PAY job on graduation.

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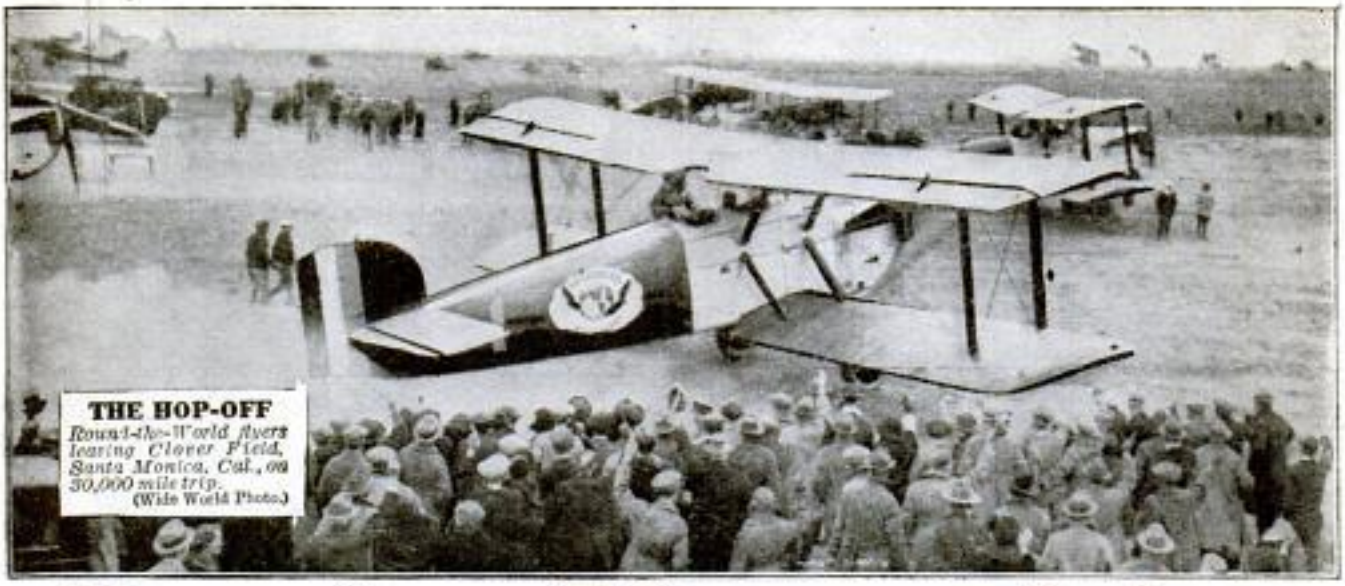

THE HOP-OFF
Round-the-World flyers leaving Clover Field, Santa Monica, Cal., on 30,000 mile trip.
(Wide World Photo.)

Daring Young Men Needed in Aviation

THERE is no field of work in the world today which offers such amazing opportunities to young men of daring and who love adventure as does Aviation. Although still in its infancy, there is a crying demand in Aviation for young men with courage, nerve and self-reliance. For those who can qualify there will be thousands of highly paid jobs which will lead quickly and surely to advancement and success.

Big Opportunities Await The Trained Man

Look over the fields of work which are open to the young man today. You will find that Aviation is the ONE FIELD that is not overcrowded—the ONE FIELD in which there is plenty of room at the top. Think of it! Only 21 years ago Orville and Wilbur Wright made the world's first airplane flight. Now airplanes fly around the world. Yes, Aviation offers the same wonderful opportunities today that the automobile and motion picture industries did 15 and 20 years ago. Men who got in on the ground floor of those industries made fortunes before others woke up. AVIATION IS NEW! It clamors for nervy young men—and the trained man has the world before him in Aviation.

Easy to Become an Aviation Expert—$50 to $100 a Week

You can qualify now quickly for one of these exciting highly paid jobs through a new, sure, easy method of training. The study of Aviation is almost as interesting as the work itself. Every lesson is fascinating and packed full of interest. That's why Aviation is so easy to learn—you don't have to force yourself to study—once you start, you can't get enough of it. Only one hour of spare time a day will give you the basic training in an amazingly short time.

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Men who have had actual experience in Aviation give you personal attention and guide you carefully through your training. They select the lessons, lectures, blueprints and bulletins. They tell you the things that are essential to your success. Every lesson is easy to read and quickly understood.

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Send coupon below for New Free Book, just out, "Opportunities in the Airplane Industry." It is interesting and instructive and will show you many things about Aviation which you never knew before. Only a limited number offered—get yours before the edition is exhausted.

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Dunlap JOB-METHOD training is built around four complete Electrical outfits which I send you without extra charge. With these valuable instruments, tools and materials, you learn by doing actual Electrical jobs. You get the theory while getting the practice. My JOB-METHOD of instruction makes it easy for you to understand the most difficult subjects.

22 Electrical Engineers

from Westinghouse, General Electric, Commonwealth Edison, Western Union and other great corporations helped me to build this wonderful home-study training. So in every department of Electricity you get your training from a *specialist* and an *authority!* These executives know what training you need to hold down the BIG-PAY positions in Electricity, and they give you just that training.

BOSS Electrical Jobs at $70 to $200 a Week!

New projects in Electricity total hundreds of millions of dollars. No other industry offers such a golden future to *trained* men, trained as I train you. Electricity rewards not only the occasional genius like Edison and Steinmetz. This giant business also pays rich prizes to thousands of men who master electrical principles as I help you master them in my JOB-METHOD instruction.

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AMERICAN SCHOOL organized NOT FOR PROFIT, gives you the benefit of royalties, profits and other savings. Write me at once and save $63 cash. Get the facts and take advantage of my GUARANTEED JOB and RAISE offer. Get the facts about your chances in the Electrical business. Get my big, free catalog, see for yourself how quickly and easily you can get ready for Big Pay!

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Don't let lack of ready money or anything else prevent you from getting my training. As early as your eleventh lesson I train you to do Electrical and Radio jobs in your spare time—to earn enough money to pay for this course and have some left over.

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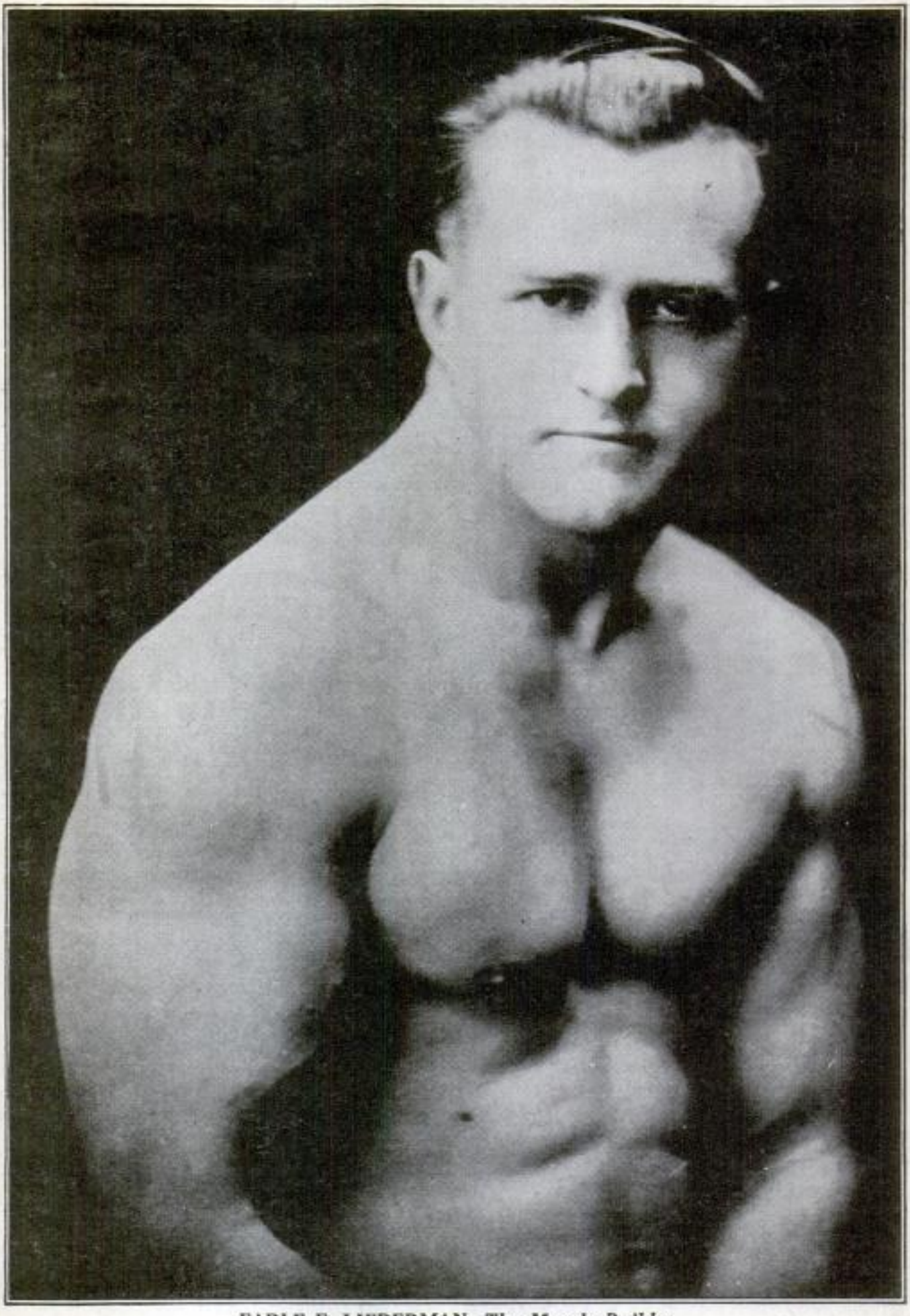

EARLE E. LIEDERMAN, *The Muscle Builder*
Author of "Science of Wrestling", "Muscle Building" and "Here's Health"
(See pages 134 and 135 in back of book)

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"Thou Shalt Not Kill"

is the most gruesome commandment handed down to mankind. A man may lie, steal or break any other law and the public will eventually forgive and forget. But let him commit murder and the cry of everybody is to give him the full penalty—*Death!* And what is the common excuse of the murderer? INSANITY! Sure, he's crazy. Any man must be crazy to commit murder.

But how about the fellow who slowly but surely kills his own body by neglect? He's the craziest one of all.

Stop! Think this over! What are you doing with your own body? Surely you don't want to be put in this class. But if you are not doing everything possible to prolong your life and keep your body just as clean and healthy as your Maker intended, you are inviting death. You are slowly but surely killing yourself.

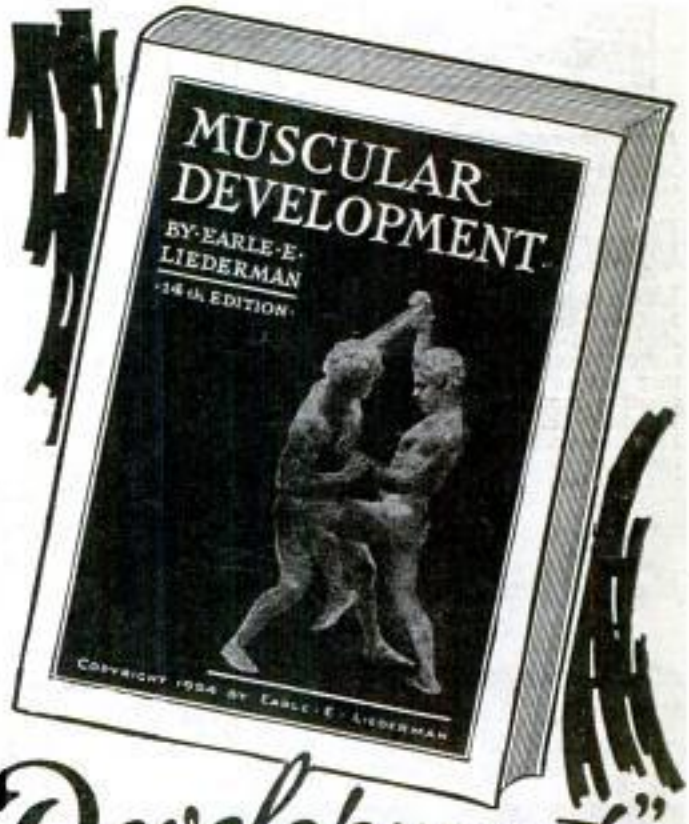
A New Life

Have you ever enjoyed the pleasures of perfect health? Have you ever felt the thrills which accompany a strong robust body? If not, you have nature's biggest gift awaiting you. That is what I have to offer you. I don't promise to feed this to you in pill form. No, you have to work for it. You can't get anything in this life without effort. Don't let anyone fool you by telling you different. I'm going to make you work, but oh boy! how you'll like it. After a few days you will feel the old pep shooting through your veins and you will crave your exercise like a kid wants his bread and sugar.

Today Is Your Day

This is your birthday. Today you start a new life. I'm going to make a real, live, "rip-snortin'" go-getter out of you. I'm going to expand that chest so it will give your lungs a treat with life-giving oxygen. This will put real vim into your blood and shoot it throughout your entire system. I'm going to broaden your shoulders and strengthen your back. I'm going to put a ripple of muscle up and down your body that will make a big, powerful he-man out of you. You will have the arms and legs of a modern Hercules. I'll clear your brain and pep up your entire system. You will be just bubbling over with vitality. You will stretch out your powerful body and shout for bigger and greater things to accomplish. Nothing will be too difficult for you to tackle.

Sounds good, doesn't it? You can bet your Sunday hat it's good. It's wonderful. And it's no idle prattle either. I'm not promising these things. I guarantee them. Do you doubt me? Make me prove it. Come on. Atta boy. Let's go.



Send For My New 64 Page Book "Muscular Development"

IT IS FREE

It contains forty-three full-page photographs of myself and some of the many prize-winning pupils I have trained. Some of these came to me as pitiful weaklings, imploring me to help them. Look them over now, and you will marvel at their present physiques. This book will prove an impetus and a real inspiration to you. It will thrill you through and through. All I ask is 10 cents to cover the cost of wrapping and mailing and it is yours to keep. This will not obligate you at all, but for the sake of your future health and happiness, do not put it off. Send today—right now, before you turn this page.

EARLE E. LIEDERMAN
Dept. 2001, 305 Broadway, New York City

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Dear Sir:—I enclose herewith 10 cents for which you are to send me, without any obligation on my part whatever, a copy of your latest book, "Muscular Development." (Please write or print plainly.)

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Be A Dental Laboratory Expert

You learn in my schools with tools, instruments and materials, not with books.

So I give you a complete Laboratory outfit absolutely free. Mail coupon for my offer.

I train you on actual Dental Laboratory jobs how to make Crowns, Plates, Bridges, etc. for Dentists. Mine is the only school of its kind with practicing, ethical Dentist in connection.

My schools at Chicago and Detroit are the largest and most completely equipped Dental Laboratory schools. And my graduates are the most successful.

Open a Laboratory

Little capital needed when you are McCarrie-trained in every branch of Mechanical Dentistry. Big demand from 60,000 Dentists for better Dental Laboratory service account lack of skilled Mechanical Dentists. Unlimited opportunities. Hundreds of locations now open for Laboratories. My training includes Laboratory management, how to get business, how to take care of it, etc.

No classes at my schools

Individual, personal instruction guaranteed to every student. Start any time. Day or evening instruction.

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State of Illinois
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Subscribed and sworn to before me this 3rd day of July 1923.

J. E. Crossfield

Notary.

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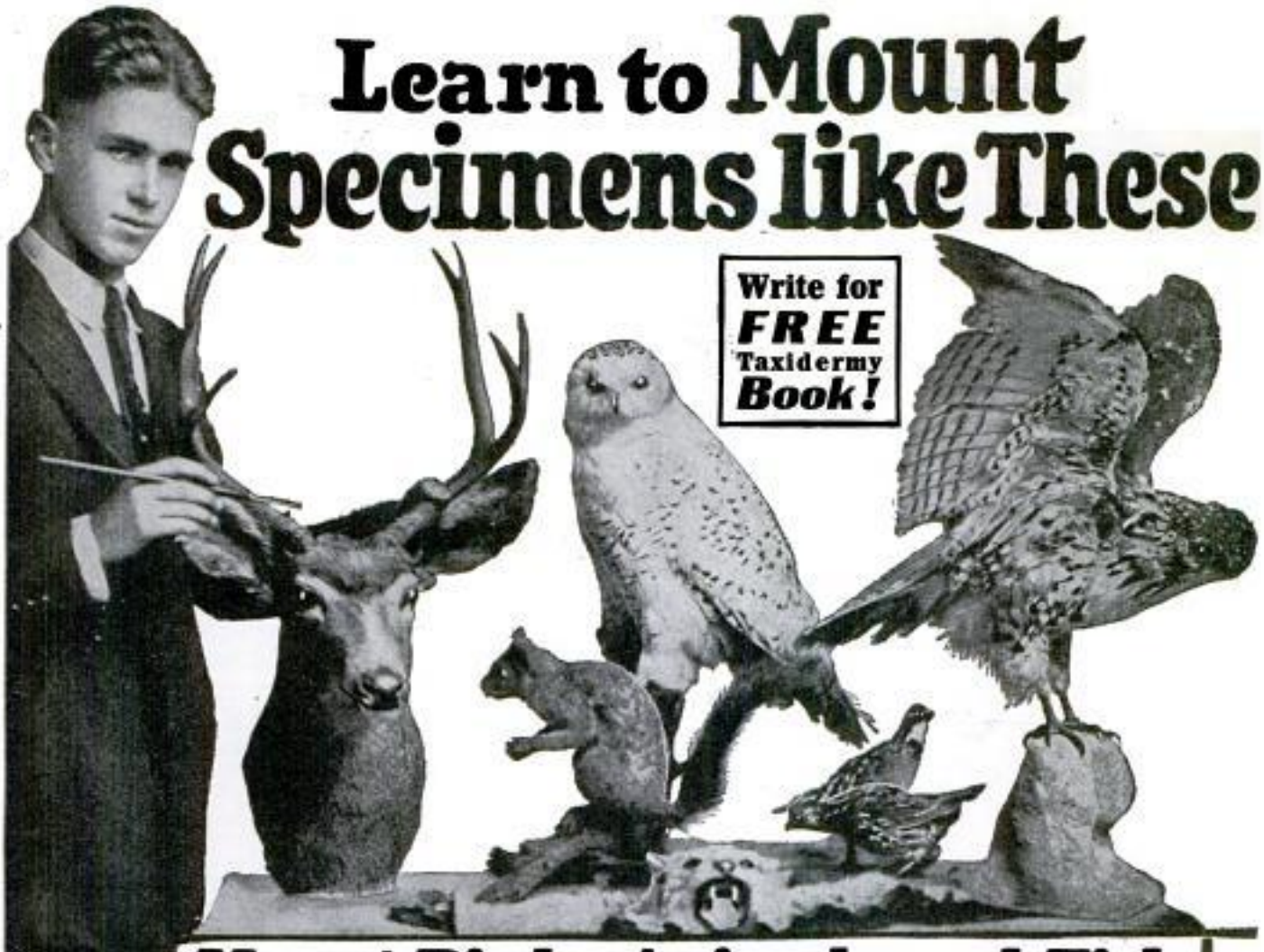

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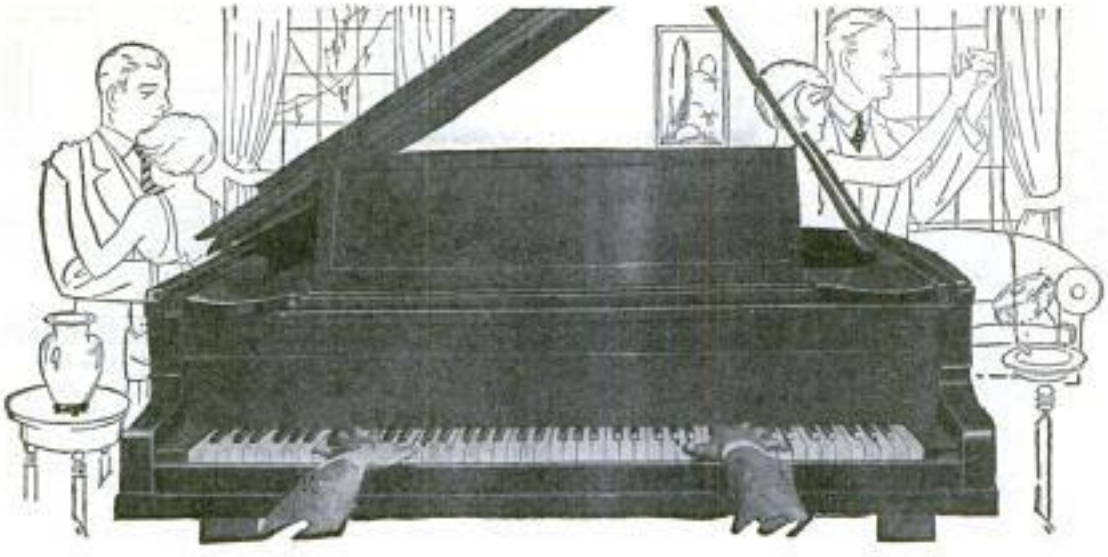

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CAN'T make you rich over night but can offer you straightforward business opportunity with income of $10.00 to $25.00 daily, and free Auto, selling my line Food Products, Toilet Articles and Standard Remedies. Proposition appeals to honest, industrious people. Write today. J. E. Johnson & Co., 338 W. Chicago, Ave., Chicago.

BIG Profits, 50 Fast Sellers Rubber Specialties—Everybody needs and buys; $50 Weekly easily made. B. & G. Rubber Co., Dept. 685, Pittsburgh, Pa.

AGENT for Ford accessory. Capital unnecessary. No freezing, no boiling in any climate, standing or running. Cheap and practical. Anyone can install. Weighs under one pound. Thousands making good. Millions demanding it. Winter best time to sell. Distributors make money fast. Write Alrlock Products, 703 Willow Street, Long Beach, Calif.

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THE Clothing Business is the second largest business in the country. Men have made fortunes in it. So can you if you go into it right. We'll put you into it right without one penny of expense to you, supply everything you need to get into the business and clear from $100.00 to $200.00 a week, right from the start. This is a wonderful opportunity, for the right man. If interested, write at once. Address Dept. 502, Goodwear, Chicago, Inc., West Adams Street at Peoria, Chicago.

NEW Marvelous Discovery. "Bestever Hand Cleaner." Works like Magic. Takes off paint, grease, grime, stains, etc., instantly. Without harm to hands. Chemical Action—No grit, sand nor abrasive. Sells like wildfire to Factories, Garages, etc. Quick repeater. Big Profit. "Sample Free." Write immediately. Bestever Products Co., 1937W Irving Park, Chicago.

AGENTS, Salesmen, Demonstrators, you will have the devil's own time trying to find a better seller than "Zippo." If there was such a thing we'd have it. Splendid profit on 50c "Go Getter" repeat article that sells on ten second demonstration. Works While You Watch It. Demonstrates value, while others waste time making claims. New discovery! Greatest Scientific Triumph of the age. It's the berries. Haven't room to tell our story here. Write immediately. Karam-Smith Co., 601 Bozan St., Ft. Wayne, Ind.

MAKE $300 to $500 month distributing Speedoline; exclusive territory; automobile free. Speedoline Co., Dept 73, Dallas, Texas.

AGENTS — Our gold-eyed needle case proposition is positively good for $50 to $300 weekly; proof and particulars free; sample outfit 15c; factory prices. Paty Needle Co., 231 Davis Sq., Somerville, Mass.

BIG Money—Selling Fiber House Brooms. Sure-Fire Seller and Repeater. Biggest Season Here. Write Today. Bartlett, Van Tine & Jones, Hillsdale, Mich.

ARE you interested in securing a Dust Mop that you can sell behind any mop made? We have it. Something new. Sold only by our representatives. No competition. Large Profit and each sale makes several others for you. Sample $1.75. Write today. The E. & N. Mfg. Co., Delphos, Ohio.

MAN in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

AGENTS—$9.00 Profit every sale of a Print-Ad Machine—used by merchants to print their wrapping paper. Fast seller. Every storekeeper interested. Automatic Print-Ad Machine Co., Dept. 10, Reading, Pa.

MAKE $60 to $200 weekly putting up our Burnished Genuine Gold window letters. Experience unnecessary. Free samples. Premier Letter Co., 121 No. Francisco, Chicago.

AGENTS. $12.85 daily. Introducing "Kut-Ezy" Self-Sharpening Shears. Cut to the end. Automatic. Guaranteed 20 years. Not for sale in stores. Every housewife interested. Quick startling demonstration makes sales easy. Spare time workers make enormous profits. No capital or experience needed. Write quick for demonstrating outfit. Masonbee Company, Shear 1541, Cincinnati, Ohio.

PATENTS. Write for my free Guide Books "How to Obtain a Patent" and "Invention and Industry" and "Record of Invention" blank before disclosing inventions. Send model or sketch of your invention for instructions. Promptness assured. No charge for above information. Clarence A. O'Brien, Registered Patent Lawyer, 589A Security Bank Building, directly across street from Patent Office, Washington, D. C. See pages 164 and 165.

WE Pay $50 a Week and expenses and give a Ford Auto to men to introduce poultry and stock compounds. Imperial Co., D-23, Parsons, Kans.

GOODYEAR Mfg. Co., 1741 Goodyear Bldg., Kansas City, Mo., is making an offer to send a handsome raincoat free to one person in each locality who will recommend it to friends. Write today.

$20 DAILY taking orders for new lamp invention needed in every farm home, church, school. We deliver, collect, pay you daily. Economy Lamp Company, 1751 Washington, Kansas City, Mo.

AGENTS, Make Big Money selling new auto invention. Hoffenberg's sold 900 in 2 months. Profit $2,700. For full particulars write Stransky Co., Dept. J-13, Pukwana, S. Dak.

MOST Wonderful Seller. 96c profit every dollar. No stock to carry. License unnecessary. Sample free. Mission Factory PM, 519 No. Halsted, Chicago, Ill.

$60-$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-D North Clark, Chicago.

EVERYBODY Needs and Buys the "Business Guide." Wells cleared $1,150 in 35 days. Send for sample. It's Free. Nichols Co., Dept. 4B, Naperville, Ill.

FREE Sample, "Rain Shield Wiper." Retails $1.00—costs (25c). Just Invented. No Cloth—No Paste—No Attachment. Sold Clear and Rainy Days. (1) Rub keeps Windshield Clear (24) hours. Automobilists buy quickly. Riley made $198 three days. Experience unnecessary. Wonderful Sideline. NuLife Corporation, Hartford, Conn.

AGENTS—$240 a month. Take orders for well known line of household specialties, food flavors, toilet preparations, etc. Full or spare time. Build a big permanent business. Must satisfy or money back. Write for free sample outfit and offer. C. H. Stuart & Co., 5567 Spring St., Newark, New York.

AGENTS Wanted—Something New—Fire Fighter sells easily. Makes a spectacular demonstration; car owners, homes, factories, stores, practically buy on sight. Our men make $10.00 to $50.00 a day. If you wish to establish a business of your own with unlimited possibilities for making big money, write us today. Fyr-Fyter Co., 446 Fyr-Fyter Bldg., Dayton, Ohio.

AGENTS—Hot Spark Transformers for all cars. More power, speed, less gas. Quick sales, big profits. 25c for sample set. Demonstrating box free. Ignition Mfg. Co., Box N-229, Omaha, Nebr.

AGENTS Wanted to Advertise Our Goods and distribute samples given to consumers; 90c an hour; write for full particulars. American Products Co., 2328 American Bldg., Cincinnati, Ohio.

SELL Magic Mending Fluid. Hosiery and Garments mended without thread. Withstands washing, boiling. Ironing. Splendid results guaranteed. "Akynco," 734 Major, B, Salt Lake, Utah.

AMAZING profits made selling Oriental Pearls, Beads, Bamboo Fountain Pens. $3.25 Doz. for pens that sell $1.00 each. Best line for Xmas trade. McCallister Co., Importers, Phelan Bldg., San Francisco, Calif.

MAKE Money Silvering Autolights, Radiators, Mirrors, tableware, stoves. Outfits, Methods Free. Sprinkle, Plater, 128, Marion, Ind.

AGENTS—Make big money selling Sharp-Easy and other new household necessities. Premier Mfg. Company, Dept. 813, Detroit, Mich.

FREE to Agents—Box Famous Herb-Lax Tablets. Wonderful for constipation, indigestion, headache, rheumatism, piles, and all troubles caused by disordered bowels, liver and stomach. A big money maker for Agents. Wonderful repeater. Virtor Remedy Co., Dept. 14, 6442 Ellis Ave., Chicago.

AGENTS, specialty men, side line salesmen can earn $75 to $100 weekly handling the Kno Kord Kurler; sell on sight to every woman; no competition; attractive profits, big future for energetic men. Send for free folder; shows how to start money coming fast. C. H. D. Electric Co., 224 W. 63rd St., Chicago, Ill.

MARVELOUS new liquid sharpens dullest razor blade. Sells to every man. Agents cleaning up. A gold mine for window demonstrators. Write immediately. Suredge, Box 2549, San Francisco, Calif.

$5.00 HOUR taking orders for Jackson "$2.95 Combination Coat." Demonstrating coat selling outfit free. Jackson Raincoat, 720 Roosevelt, Chicago.

KU KLUX Klan Pocketpiece; Free sample to Agents; send dime for postage, wrapping and Klan Katalog. Box 524-PM, Omaha, Nebr.

SELL Books by Mail. Get our Money-Making Circulars at one-fourth cost. Big profits on sales. Particulars free. Elfco, 525F, S. Dearborn, Chicago.

AGENTS make $15 to $25 daily, full time or sideline, selling the farmers and dairymen something they have been looking for. Write to-day for particulars and territory. Stock Remedy and Stock Food Agents write to-day for our side-line proposition that will bring you big returns. Non-Spill Sanitary Dairy Pail Co., St. Louis, Mo.

AGENTS—$20 Daily taking orders Patented Work, Flannel and High-Grade Dress Shirts. Factory to wearer below store prices. Pay daily. We deliver. Patent Shirt Co., 16 Pancoe Bldg., Chicago.

GIVEN! Knitter and Home Contract. Try-on Stocking Stores, Dept. 114, Lowell (the Mill City), Mass., are giving a knitter and a work contract to one agent in each community, as they want to introduce their improved machinery and Try-on Good Hosiery. Write them today if you want the chance.

BIG Profit. No risk. Fast selling Rubber Aprons and Baby Goods. Many Styles, Dainty Colors. Maymeda Co., Dept. P, 39 Murray St., New York.

AGENTS—Our goods endorsed by Good Housekeeping Institute. "Milk Bottle Opener," "Ice Pick," "Combination Bottle Opener," "Strawberry Huller." Sample outfit and price list 25c. Windsor Stephens & Co., Waltham, Mass.

I PAY Men $100 a week, selling our fine made-to-measure, all-wool suits—Direct to Wearer—All one price, $31.50. Biggest values. Highest commissions in advance. We deliver and collect. 6x9 swatch samples furnished. Write today. State selling experience fully. W. Z. Gibson, Inc., 161 W. Harrison St., Dept. A-517, Chicago.

MONEY-MAKER new device removes glare from auto headlights. Newman, 437 Broadway, Bayonne, N. J.

AGENTS and Side Line Salesmen wanted to sell the Easy Fill Gasoline Tank Cap and Gauge for Fords. A big proposition for live men. Write today. Easy Fill Cap Co., 929 Lawrence Ave., Chicago.

AGENTS—To sell "Little Wonder" Check Protector. Vest Pocket size. Perforates amount in figures through written amount on dollar line of check. Retails fifty cents. Sample half price. Exclusive territory. Piqua Check Protector Co., Piqua, Ohio.

EVERYBODY buys our specialties. New inventions, all household necessities. $10 worth of samples absolutely free on our refund plan. Write today. General Products Co., Dept. 7-NE, Newark, N. J.

AGENTS, New profitable plan. Big permanent income selling rugs factory prices. Free outfit now. Write Maisley-Payne Mfg. Co., 417 Sudbury St., Boston.

MAKE $25.00 showing "Consumers All-Weather Coats." Special introductory price $2.95. Complete outfit Free. Consumers Manufacturing, 728 Roosevelt, Chicago.

MANUFACTURE Potato Chips. Big Profits. Start in own kitchen. We furnish sacks. Formula, manufacturing instructions, sales plan. L. Allen, 3945 Chicago Ave., Chicago.

UPTHEYGO Kuff-Buttons automatically open, close, when sleeves are raised or lowered. Holds sleeves in any position on arm. Wonderful convenience, sells Everywhere. Sample pair $1.00. Big Profits. Flexo, Sheboygan, Wis.

ELECTRIC Hot Plate and Toaster. Quality merchandise. Sells $6.50. Send $3.75 for sample and sales helps. Stoughton Mfg. Corp., Stoughton, Wis.

AGENTS—Make $150 weekly. Our new household specialties sell like wildfire. Build business your own. You can't afford to pass this up. Knights Manufacturing Co., 37 Hamilton Blvd., Buffalo, N. Y.

4-OZ. Cocoanut Oil Shampoo, $1.20 dozen. American Co., 1551 Donaldson, Cincinnati, Ohio.

WASH Clothes the new way. Use the Torrent Automatic Washer. You will be delighted. Special offer to one in each locality. Storm Royalty Co., 3610 Enright Ave., St. Louis, Mo.

PAINTERS, carpenters, handymen: make money in dull season. Start furniture painting business on nearly nothing; mostly all profit; experience not needed. Winning plan brings customers. John Braceland, 1437 S. Ninth, Philadelphia, Pa.

WONDERFUL Ford Seller. Agents wanted. Big Profits. U. S. Iron Works, Seattle, Wash.

AGENTS—Men and women, sell useful articles for the home. 100% profit. For catalog and prices, P. Miller, Box 3, Tremont Station, New York.

YOU Can Make Good Durable Paint and Varnish 40c per gallon. Write Dept. 2, Emmelmann Bros. Mfg. Co., Indianapolis, Ind.

LARGER Profits Making Auto Polish, Top Dressing, Carbon Solvent, Radiator Cement. The four formulas $1. Experience unnecessary. Jo-La-Ko, Box 862, Station C, Los Angeles, Calif.

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CLOTHING Sensation! New line of men's clothes. All-wool suits and topcoats all at the one low price of $23.50. Nothing higher. We pay biggest commissions cash with order, supply finest selling outfit and give powerful co-operation. 3 to 6 orders a day gives income of $60.00 to $125.00 a week. We have men who earn even more and can prove it. If you're looking for a real proposition and a money maker, write us at once. Experience isn't necessary. If you're honest, earnest and willing to work, we'll train you. Write at once to Dept. 205, William C. Bartlett, Inc., 850 W. Adams St., Chicago.

AGENTS $10 day selling darning attachment for sewing machines. Sample 50c. E. F. Pope, Willard, Ohio.

AGENTS, Sell our billfolds and notions. Universal Sales Company, Dept. D, Box 152, Springfield, Ill.

YOU wish a big income? Your fault if you don't make a fortune. Write to Lucky Spencer for information. 4201 South Main St., Los Angeles, Calif.

FORD-WARMER makes Fords start in coldest weather. Electric. Price $3.00. Send $1.25 for sample. Stoughton Mfg. Corp., Stoughton, Wis.

PORTRAITS, photo pillow tops, frames, sheet pictures, medallions, merchants' signs, food products, rubber aprons, guaranteed hose, toilet requisites, luminous crucifixes. Catalog 50 specialties free. 30 days credit. Jas. C. Bailey Co., Desk A-1, Chicago.

AGENTS, At Last, Livest Supply house, wholesale druggists, extracts, medicines, perfumes—everything. Sales for every home. The Jet. Pharmacal Co., Allentown, Pa.

AGENTS:—Sell Magic Washing Compound. Your name on package. Great repeater. 300% profit. Miller made $1,000 in 6 weeks. Sample free. "Besco," 1943-W. Irving Park, Chicago.

$5 STARTED me earning $200 weekly with Mail-Order business. Anyone can do the same. Outfits furnished. Particulars free. Peerless Service, 447 Waterville, Me.

IMPORTED Manila Cigars from $2.50 per hundred up. Write for Agents' proposition. American Products Co., 245 West 34th St., New York City.

GET posted—Good prices paid for butterflies, insects. See Sinclair display advertisement, page 64.

A SPLENDID business is yours making chipped glass number and name plates. Write for full particulars. Simplex Company, 136 West 21st St., New York.

TAILORING Agents: Our guaranteed $21.50 and $31.50 all wool tailored to order suits are $10 to $20 cheaper than store prices. Commission in advance. Protected territory. Beautiful assortment 6x9 swatches free. J. B. Simpson, Dept. 1027, 843 Adams, Chicago.

EARN money at home spare time or evenings. No peddling. Permanent. Work in your own home. Write Downs Co., 2323A Myrtle, St. Paul, Minn.

AMBITIOUS Young Men and Women Are making good incomes in spare time, introducing Zer, the Waterless Hand Soap. It is something new, which every auto driver, mechanic and housewife needs. Send post card for particulars to Parke Corporation, Dept. C, Kalamazoo, Mich.

AGENTS—I'll pay you $1.25 for your spare time. Easy, pleasant work in your locality showing samples and distributing teas, coffees and food products among friends and neighbors. Complete sample outfit to first person answering from your territory. Harley Co., A-2010 Harley Bldg., Dayton, Ohio.

AGENTS—Quick profits assured; $100 per week possible, selling improved vacuum cleaner; no electric cords, no motors to get out of order; does same work as most expensive electric machines; housewives convinced by single demonstration; best seller in years. Write quick for our profit-making plan. The Marvel Co., Department 225, Hammond, Ind.

50,000 AGENTS Wanted—We are constantly receiving requests from reliable Manufacturers, Importers, Publishers, Supply Houses, etc., for names of high-grade Agents. State line of goods interested in, enclosing 25c stamps or coin for live propositions, free samples, etc. Taber Brothers Co., 311 Fifth Avenue, New York.

BLUE White Sapphires — Rival genuine Diamonds $3 carat. Genuine Mother of Pearl necklace beautiful, absolutely new idea 32" length $3. Agents exclusive wholesale specialties. Hurry. Pauer (Importer), 152 Dewitt, Buffalo, N. Y.

WANT Distributing Agents for Hanslick, the new original powdered handsoap. Removes grease, grime, ink, paint, and most anything from the hands without injury to skin. Every mechanic and auto-owner, everybody who gets his hands dirty, will be a customer. Great opportunity for hustler to get in business. Full information and sample free. Solar Products Company, A-124 West Lake, Chicago.

YOUNG Men who want to make their spare time pay from $20 to $50 a week are offered an opportunity to sell an article which every man buys on sight, made by Ingersoll, the dollar watch man; retails for $1; you don't need to be a salesman; merely to show it to sell; big profits, quick sales and constant repeat business. Write today. Robt. H. Ingersoll, 476 Broadway, Dept. 206, New York.

AGENTS—Coin money selling our new fabric table cover; needs no laundering, housewives wild about them; send for free offer. Mfgr., Box 67, Medford, Mass.

SELL every merchant Embossed Display Signs. 300% Profit for you. Means a fortune for workers. Write today for territory. Details free. Sample free. Artistic Sign Works, 799 Broadway, New York.

$300.00 A MONTH to distribute everyday household necessity in rural and small town districts. No money needed. Million dollar firm behind it. Write for particulars and state territory desired. B. M. Johnson, 611 W. Lake, Chicago.

$3.00 AN hour for your spare time. New proven success. Send dime for full particulars. K. Rothe, 3949 Metropolitan, Chicago.

AGENTS, both sexes, we manufacture and control new household article. Fast seller. Big profits. Exclusive territory. Write now. Connolly, 123 Liberty St., New York.

A BUSINESS of Your Own—Make and Sell Chipped Glass Name and Number Plates, Checkerboards, Signs. Large Booklet Free. E. Palmer, 512, Wooster, Ohio.

TURN your spare time into dollars selling Polmet Polishing Cloth that cleans all metals without liquid, paste or powder. Retails 25c. Our agents say it sells like "hot-cakes." Prove it yourself with free sample sent on request. F. C. Gale Co., 122 Edinboro St., Boston.

AGENTS! Profit with first order selling shirts. Factory to wearer. $50 to $100 weekly. Write Swanton Sales Co., Dept. 12, 1270 Broadway, New York.

AGENTS—Something new. Wonderful invention. Ford Owners wild over it. Distributors profit 300%. Thirty-day trial offer. Write K. Super, 1304 Pondulac, Milwaukee, Wis.

GREAT opportunity for hustlers to clean up with Sattler Automobile signals. Every auto driver buys on sight. Wonderful for closed and open cars. Simple construction. Retails $1.25. Substantial discount to agents. Particulars free. Write or wire today. Hans Sattler, Sheboygan, Wis.

BIG Profits. New $3.50 Automatic Adding Machine. Quick Sales. No competition. Ten daily easy. Absolutely accurate. Fully guaranteed. Pocket size. Business people everywhere positive customers. Exclusive territory to workers. Act quick. Bassett Company, 1458-A Hollywood Ave., Chicago.

SELL Komik Display Kards, Price tickets, card holders, display stands, etc. Big Demand. Komik Advertising Co., Cambridge, Ohio.

AGENTS—N-R-G Laundry Tablets, the old reliable moneymaker for live agents. Millions sold—200% profit—sales waiting for you. Clothes washed spotlessly clean in 10 minutes without rubbing. Free samples. N-R-G Company, 732-B, N. Franklin, Chicago.

MAIL order business; big profits; no stock to carry; we furnish everything; particulars free. J. M. Hunt Company, Morrisville, Pa.

LIVE Agents Make $10 Day selling Eureka Strainer and Splash Preventer for every water faucet. Takes on sight. Widely advertised and known. Get details today. A. B. Seed Filter & Mfg. Company, 73 Franklin, New York.

SUCCEED With Your Own Products—Formulas By Experts. Manufacturing Processes. Trade Secrets. Different, Dependable, Profitable. Interesting Catalog Free. E. Thaxly Co., Washington, D. C.

SELL Union Label All-Wool Made-to-Measure Suits direct to wearer for $24.50. Scott System Wholesale Tailors, 99M, Bedford Street, Boston.

"HOW to Sell Patents" free. Patent News-O, Washington, D. C.

$300 FIRST Two Weeks—made by Weigand, Johnstown, Pa., selling "Slide-O-Graf Jr." Novel, effective—sidewalk advertisement projector. Sells fast, big non-competitive field. $14 Profit every sale. Standard Slide Corp., 207 W. 48th St., New York.

SAFETY Comfort Seat for Cleaning windows, sells to every home and building where windows must be cleaned. Prevents danger and accidents. Big profit; quick sales, no competition. Super-Sete Mfg. Co., Dept. 46, 303 Fifth Avenue, New York.

ANY man can easily make big money by addressing Consolidated Co., 632 South Dearborn, Chicago.

AGENTS Wanted. Men and Women. Exclusive territory. Marvelous new camera takes and finishes pictures inside camera in one minute. Wonderful opportunity. Crown Co., 909 Romax Bldg., New York.

$20 PROFIT daily selling needlebooks; costs 3c-5c each; sells 25c, value 50c; Three samples 25c. Catalogue Free. Needlebook Specialty Co., 661 Broadway, New York.

AGENTS: 500% profit. "Happy Home Maker Shampoo" builds your own big business. Martin of Indiana made $75.00 in one day. Missouri man made $750.00 one month. Exclusive territory. Geo. A. Schmidt & Co., 236 W. North Ave., Chicago.

AGENTS, $20 daily easy selling household necessity every woman wants. New invention reduces price. Big profit. Fagley & Halpen, 303 Cherry Street, Dept. 5, Philadelphia, Pa.

ABSOLUTELY free box Bassett's Native Herbs sent to introduce. For Constipation, indigestion, headache, rheumatism. Big money selling, all or part time. Established 1879. Bassett, Dept. 8, Columbus, Ohio.

AT Last! Diamond Rival Discovered! Amazing blue white Rajah Gem astounds jewelry world and deceives experts! Beautiful Sample case Free! $100 weekly! Write Quick! Rajah Diamond Co., Dept. F-7, Salisbury, N. C.

MAIL-ORDER Houses and Distributors: We pack French made beauty creams, face powders, perfumes, toilet preparations with your label. Chemist, 944A North Clark, Chicago.

SELL Beautiful $7.00 Red and Black Oversized hand made Fountain Pens for $3.50. Cost you $1.75. With bonus $1.55. Post card brings full details, or C. O. D. sample, at wholesale price. Johnson Pen Co., 117 So. First St., Rockford, Ill. Dept. P.

DASH control Gas Reserve Valves for Fords; $25.00 to $50.00 per day permanent income established; customers do the selling. Write today. The Will-Burt Co., Orrville, Ohio.

AGENTS—Be Independent, make big profit with our soap, toilet articles and household necessities. Get free sample case offer. Ho-Ro-Co., 2725 Dodier, St. Louis, Mo.

AGENTS wanted by Manufacturer of exclusive Novelty Knitted Sport Dresses and other knitted fabrics, selling direct to consumer. Attractive commission—large sample outfit free. Straightline Mills, Inc., 366 Broadway, New York City.

CAN you sell to colored people? Write, Eston Co., Dept. 101, 2300 Second Ave., Birmingham, Ala.

JEFFORDS sold 25 cans his first 4 hours; profits $7.50. Hundreds of others doing as well, or better. Particulars and sample free. Write today. The Mallard Chemical Company, Dept. EX, Saint Louis, Mo.

$8.00 TO $20.00 per day. A wonderful seller. Any man, woman, boy or girl can make big wages Selling Crimp Grip Clothes Line Fasteners. It is a perfect rope holder and can be used for many purposes. Crimp Grips are a simple, time-saving device. They last a life time and will not rust; it holds the line tight, and saves time on wash days. Every buyer is a booster. Send 50c for Mounted Sample and one pair of Crimp Grip Clothes Line Fasteners. Write for particulars. Crimp Grip Company, Belvidere, Ill.

$25.00 A DAY Easy! Best Line of Brushes on the market. 90 varieties, including famous Auto Fountain Washer. Excellent territory available. Write immediately. Philadelphia Brush Co., Dept. 25, Vineland, N. J.

AGENTS — Make $25.00-$100.00 weekly selling Comet Sprayers and Autowashers to Farmers and Autoists. All brass. Throws continuous stream. Established 30 years. Particulars free. Rusler Co., Johnstown, Ohio, Box C36.

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AGENTS clear $50.00 weekly selling Opaline Portraits. Expense money advanced. Credit given. Big line now ready. Samples and Catalog free. Consolidated Portrait Co., Desk 2, Chicago.

AGENTS—Steady Income. Large manufacturer of handkerchiefs and dress goods, etc., wishes representative in each locality. Factory to consumer. Big profits, honest goods. Credit given. Send for particulars. Freeport Mfg. Co., 59 Main St., Brooklyn, N. Y.

SELL Shirts and Overalls direct to wearer. Big profits. Work full or spare time. No experience required. Big variety dress shirts with splendid line Union-made work and flannel shirts, overalls, coveralls and khaki pants. Write today for free selling outfit. The Nimrod Shirt Co., Dept. 8, 4712 N. Kedzie Ave., Chicago.

AGENTS Our new Fire Extinguisher sells for $4.95 with big commissions. Mechanically perfect—can't leak. Exclusive territory. Free outfit. Write. Nichols Co., Naperville, Ill., Dept. F. 1.

AGENTS—line up with better Felt Rugs now. Our new rug novelties increase your income. Here's your chance! Newark Felt Rug Co., 27C, 18th Ave., Newark, N. J.

HEATING with oil is in its infancy. Get in while the getting is good. Our burners make good. Agents wanted. Exclusive rights. Economy Oil Burner Co., 718-720 Second St., Webster City, Iowa.

SELF - THREADING Needles, Needle Books, Machine needles, find sales in every home. Fine side lines, easily carried, big profits, sample and catalogues free. Prentice Lee, 145 East 23rd St., New York.

AGENTS make 500% profit handling auto monograms, window letters, transfers, novelty signs. Catalog free. Hinton Co., 1153 N. Wells St., Chicago.

MAKE $10.00 to $25.00 daily selling our Standard Books, Bibles and Testaments. Easy to sell. Big profits. Permanent position for responsible producers. Write National Book & Bible House, Desk 1, 36 S. State, Chicago, Ill.

BIG Money Selling Gold Initials. Quick Sales. Every Car Owner Buys. You Charge $1.50—Make $1.44 Every Sale. Your Profit $20 Daily. No License. No Experience. "Samples Free." NuLife (0) Monogram Company, Hartford, Conn.

AGENTS—Write for Free Samples. Sell Madison "Better-Made" Shirts for large Manufacturer direct to wearer. No capital or experience required. Many earn $100 weekly and bonus. Madison Mills, 564 Broadway, New York.

AGENTS—$75.00 Weekly Selling Nustile Guaranteed Hosiery direct to wearer. Your pay daily in advance, we deliver and collect. All styles and colors. No experience necessary. Special extra monthly bonus. Sample outfit furnished. Write for particulars. Nustile Hosiery Mills, Dept. 175, Philadelphia, Penna.

EVERYBODY Buys new, instant stain and rust remover. For clothing, table linen, etc. Fine premium with every sale. Big, Quick Profits. Free Outfit. Write today. Christy, 51 Union, Newark, New York.

10,000,000 FORDS need "Teuscher" fan belts. 50% profit selling dealers; 250% selling owners. Write quick. Teuscher Belting Co., St. Louis.

BIG profits selling our practical patented specialties. Write for particulars. Welch Brothers Co., North Chicago, Ill.

AUTO owner tire agent wanted each locality to use and take orders for handmade Mellinger fabric and cord tires; guarantee bond 8,000 and 12,000 miles (no seconds); shipped prepaid on approval; get your tires free; no capital or experience required; make $100 to $300 weekly. Write for wholesale prices and sample kit. Address, Mellinger Tire Co., Dept. 200, Kansas City, Mo.

AGENTS—Good salary and commission selling "Ratskyll," new rat and mouse exterminator; ready for use; no bait required; non-poisonous; rodents die outside premises; no odor. Empire Specialties Co., 1549 N. Wells, Dept. 301, Chicago, Ill.

AT Last—World's Greatest Adding Machine. Almost human. Retails $15; work equals $300 machine. $500 monthly easily made, demonstrating to stores, offices, garages, factories. Simple, easy; adds, subtracts, multiplies, divides automatically. Speedy, accurate, durable, handsome. Five year guarantee. Tremendous demand, amazing profits. Liberal trial offer. Protected territory. Write quick. Lightning Calculator Corp., Dept. F, Grand Rapids, Mich.

EASY, pleasant work for Mechanics, Shop Men, Clerks, during spare hours; will add many dollars to their salaries. Also want persons who can give full time. Big wages assured. Novelty Cutlery Co., 67 Bar St., Canton, Ohio.

POLMET—The Wonderful Polishing Cloth that cleans all metals without liquid, paste or powder. Approved by "Good Housekeeping" and "Modern Priscilla"—sells fast at 25c. Sample free. Gale & Co., Inc., 15 Edinboro St., Boston.

AGENTS—Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marul Company, Tribune Bldg., New York, N. Y.

GET Our Free Sample Case—Toilet articles, perfumes and specialties. Wonderfully profitable. La Derma Co., Dept. A, St. Louis, Mo.

AGENTS—Stamping names on Pocket Key Protectors; sample Check with your name and address, 25c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

MAKE $17 daily—Finest Extracts, Food Products, Toilet Preparations, Household Necessities. Credit: Sample Case Free. Write for amazing offer. Perkins Products, B-6, Hastings, Nebr.

AGENTS: Big Money Monogramming by Transfer Method. Catalog Showing Over 50 Styles and Particulars Free. Motorists' Accessories Co., Mansfield, Ohio.

AGENTS: Big Profits. Best and cheapest window letters made. Easily applied. Dime brings five samples. Particulars free. Stalbrite Co., 1115 Second Ave., New York.

MAKE $25 to $50 Week, representing Clow's Famous Philadelphia Hosiery, direct from mill—for men, women, children. Every pair guaranteed. Prices that win. Free book "How to Start" tells the story. George Clows Company, Desk 31, Philadelphia, Pa.

YOU can be your own boss with our Key-Check outfit. Good for $5 a day stamping names on pocket key checks, fobs, etc. Sample check with your name and address, 20 cents. Pease Die Works, Dept M, Winchester, N. H.

INSTANT Weld. Repairs largest punctures without cement or heat. Lenn's profit one day, $56. Write quick. Free sample; territory going fast. Tourists' Pride Mfg. Co., Desk T, Minneapolis, Minn.

EARN $10 daily silvering mirrors, plating and refinishing metalware, autos, chandeliers, bedsteads, headlights. Outfits furnished. E. Decie Laboratories, 1133 Broadway, New York.

AGENTS sell Wolverine Laundry Soap. Wonderful repeater and good profit maker. Free Auto to hustlers. Wolverine Soap Co., Dept. B37, Grand Rapids, Mich.

EVERYBODY uses extracts. Sell Duo Double Strength Extracts. Complete line household necessities. Big repeaters. Write today, Duo Co., Dept. E1, Attica, N. Y.

PATENTED Cigar Lighters with Glass Advertising Front. Also Electric Cigar Moisteners. Wonderful Sellers. No Competition. Big Steady Profits. Proof, Cuts, Sales Plan Free. Drake Mfg. Co., Dept. M, Milwaukee, Wis.

BIG Money and Fast Sales. Every owner buys Gold Initials for his auto. You charge $1.50; make $1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

IF you want good live agents—fellows who can get the business—ask me how others are doing it. I'll gladly render the necessary assistance. Geo. F. Baker, Mgr. Classified Advertising, Popular Mechanics Magazine, Chicago.

AGENTS—Send for free sample "Fretnot"—washday wonder. You can clear at least $20 to $100 weekly, according to spare or whole time. You don't have to talk; if she doesn't buy at sight, leave sample; she will be looking for you long before you are able to make the rounds again. Samples furnished free. Premiums for your customers. Exclusive territory. Credit given. Empire Specialties Co., 1549 N. Wells, Dept. 101, Chicago.

BUILD permanent business. Men's, Women's, Children's guaranteed shoes direct to wearer. A. P. Condon, Sales Manager Allen Shoe Co., 110 Summer, Boston.

WE Start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., Dept. 201, St. Louis.

TO secure agents or salesmen or for selling farms and reaching investors, use classified (want) ads in largest newspapers and magazines. Price list No. 30 sent free. Ankrum Advertising Agency, 20 W. Jackson Blvd., Chicago, Ill. The largest classified advertising agency in the U. S.

AGENTS—Men and Women. Establish permanent business. 3ic money order brings can of Gravy Crystals, a wonderful Gravy and Stew Improver. Try it and convince yourself. Every Store and Home a prospect. New product with big future. Exclusive territory to live representatives. Smith & Gray, Manufacturers, Guinda, California.

WONDERFUL! Startling! Amazing! Our Ex-Cel Luminous Crucifix and Magical (Luminous) Necklace shine brilliantly in the dark. Sell on first demonstration. Big profits to you. Write for further particulars, or better still, send for sample and territory protection immediately. Crucifix $1.50, Necklace $1.00, postpaid. W. G. Hannan Co., Dept. B, 57 E. 18th St., Chicago.

SELL the Latest, Quickest Selling Specialties Ever Known—Famous "Hahway" self-lighting pocket Cigar Lighters and Gas Lighters, Low Prices. Easily Demonstrated. Sell to Dealers. Employ Sub Agents. Exclusive Territory. Make over 100% Profit. P. Bernhardt, 148 Chambers Street, New York.

EARN big money fast applying gold initials to autos. Every owner buys—$1.35 profit on $1.50 sale—particulars and samples free. Write quick. Lithogram Co., Dept. 17, East Orange, N. J.

HIGH GRADE SALESMEN WANTED

SALESMAN Wanted — Old established manufacturer introducing new Ford accessory has unusual proposition to make to side line men calling on dealer trade. Good winter seller. Low price makes easy sales. Thousands already in use. Liberal commission. Exceptional repeater. Will protect good men in territory. Jenkins-Vulcan, 504 No. 8th St., Richmond, Ind.

SALESMEN Wanted. Instalment plan. Sell our guaranteed all-wool suits, handtailored to order, on monthly payments. You collect and keep first payment. We deliver and collect instalments. All suits at one popular price. Our men easily average $50 and up a week. Protected territory to hustlers. Men wanted who can furnish good references as being reliable and industrious. Write us fully about yourself. Bristol Tailoring Co., 28 Hopkins Place, Baltimore, Md.

SALESMEN Wanted—Specialize in Deodorizing! Unique product interests every business and profession! Demonstrations make cash sales, repeats follow every three months! Pleasant, profitable connection. Large earnings first week. We tell you how. Mfg. by W. J. Howell, Allentown, Pa.

RETAIL monumental salesman. Memorial Art Granite Company, St. Cloud, Minn.

THE Jackson Mfg. Co., 1331 16th St., Denver, Colo., has salesmen clearing as high as $85.00 daily selling their newly patented auto specialty. Write them for free sample and particulars.

SALESMEN: Sell Men's Highest Grade Shoes Factory to Wearer. We have over one hundred men averaging over $75 weekly. High class, legitimate, permanent proposition. Our shoes have strongest selling appeal. Sold with iron-clad guarantee. Not sold house to house and every working man everywhere a prospect. This is the best proposition in direct selling field. Only capital required is energy and ambition. Write today for details. Carson Shoe Co., Box 123 Essex Station, Boston, Mass.

SALESMEN and District Managers to sell constantly used, repeating building specialties to factories, public institutions and building owners of all kinds. Products established over twelve years among thousands of largest users including U. S. Government. Immediate big earnings and promotion with $100,000.00 company to ambitious capable men. Write at once. The Colorcraft Company, 897 W. 70th, Cleveland, Ohio.

SIDELINE Salesmen—$100—$200 monthly selling Insto, "The Perfect Hand Cleanser," to grocers, garages, hardware stores. Steady repeater. Attractive proposition to retailer makes Insto sales easy. Write for particulars. W. A. Marsh, Distributor, Westfield, N. Y.

SALESMAN: If You Think in Terms of $6,000 the First Year, Write Me Personally. Strong line for retail stores. Nationally advertised. Established concern has unusual opportunity. Liberal weekly advance to producer. Geo. R. Williams, Mgr., 1922 Euclid Avenue, Cleveland, Ohio, Dept. 200.

Copyrighted material

SALESMEN—Earn $200 to $500 a month selling the beautiful, artistic Multi-Light electric lamps. Special 6 stage dimming feature a sales clincher. Write for our big proposition. Multi-Light Lamp Works, 2601 Spy Run, Fort Wayne, Ind.

WANTED: Able specialty salesmen, something different, easily sold, all retailers; liberal commissions, drawing accounts. Salesmen making from $25 to $75 daily. Permanent income from repeat business. Address National Electric Company, Desk 9, Cedar Rapids, Iowa.

DISTRIBUTORS — Screw-holding Screw Driver. Handiest Tool ever invented. Unlimited Market. Tremendous demand! Big repeat earnings! Write Coburn Tool, 736C, Boylston, Boston, Mass.

SALESMEN: Sell Four Square Suits $12.50—guaranteed two years. All wool overcoats $19.50, five different patterns. $3.00 to $5.50 each sale. Profits in advance. Complete line, coat, vest, pants, riding pants, overcoats, slip-ons, caps. One-day delivery. District territories open. Stone-Field Corporation, X2556 So. Wabash, Chicago.

WRITE for Free Selling Outfit. Earn $100 next week. Tailored to fit suits $12.50, $13.50. Stand water, fire, snag tests. Earn bigger money selling SuperKloth Economy Clothes. Experience unnecessary. Union made. Commission to $8.25 per sale in advance. Quality sells on sight. Economy Clothing Mfg. Co., Dept. D-47, 2035-49 Charleston St., Chicago, Ill.

RESPONSIBLE representatives wanted for new marvelous Pocket Cigar Lighter. Sells on moment's demonstration to consumers and dealers. Big profits and exclusive territory rights. Send for particulars and selling plans. Enclose 5c stamps for sample. Masterlite Corp., 110 East 23rd St., New York.

SALESMEN and District Managers: Earn $25 daily selling Lovett's Patented Pricing System. Quick Seller. Lovett Mfg., Dept. A-103, 93 Federal St., Boston, Mass.

MR. BRUSH Salesmen:—Old Established New York Brush Manufacturers requires the services of men in all territories to sell their extensive line of Sanitary Twisted in Wire Brushes. We pay larger commissions than any other Brush House in the country. Write immediately for our proposition. Wire Grip Sanitary Brush Corp., 15 Mercer St., New York.

A GREATER income—a solid paying business—can be yours. High-grade men everywhere are joining our distributor organization, not alone because of immediate profits but because of the opportunity to increase these profits year after year. For profitable proposition write CFSCO, 15 N. 10th St., Richmond, Ind.

WE'RE Passing the Buck—Thousands of Bucks to you. Selling Alexander Film Publicity passes up to $25,000 yearly to a single salesman. The average makes $50.00 a day. The proposition is new, convincingly productive—advertising by real movies. Big field. No competition in quality of trailers. No investment. Write, Alexander Film Co., 3289 S. Broadway, Denver, Colo.

MAKE $8 to $10 extra daily selling new unique metal pipe rack and bookend "Peter Putter." Amazingly big seller in gift, variety and drug stores. Get full details. Acorn Metal Works, 102 Walnut St., Bloomfield, N. J.

SALESMEN—Sell "Amenz" made-to-measure and ready-made shirts; wonderful features; highest commissions. Samples free. Menzin Shirt Co., 481-J East Tremont Ave., New York.

TAILORING Salesmen: Our guaranteed $21.50 and $31.50 all wool tailored to order suits are $10 to $20 cheaper than store prices. Commission in advance. Protected territory. Beautiful assortment 6x9 swatches free. J. B. Simpson, Dept. 1628, 843 Adams, Chicago.

$15.00 DAILY Easy — selling General Protection Service. Federal Detective Association, New Orleans, La.

SALESMEN—"Big money" class, to sell dealers, jobbers. Pomeroy Electric (Heat) Primer guarantees starting any car easily coldest day. Sold for years. Proved by thousands. Nationally advertised. Special co-operative sales plan. Write immediately. Henroy Auto Service, Rochester, N. Y.

WANTED—Experienced aluminum ware salesmen with successful record, who prefer commission payments and can finance selves. Some exclusive territory available. No objection to secondary sideline. The Enterprise Aluminum Co., Massillon, Ohio.

SELL our Sanitary household and auto brushes. Lower retail prices. Larger commissions. Write for our proposition. Union Brush Co., 317 Dwight St., Springfield, Mass.

SALESMEN: Part or spare time. Make 150% profit selling Gas-O-Pep tablets for Auto and Tractor. Guaranteed to remove carbon, increase mileage and power. Big gas saver. Fast selling established line. Get your territory now. Taylor Products Mfg. Co., 24 West Naghten, Columbus, Ohio.

ARE You Old at Forty? See our advertisement on page 159 of this issue. The Electro Thermal Company, 2137 Main Street, Steubenville, Ohio.

FOUR $7.50 sales to merchants net you $20.00 daily. Sayers Systems, 2803 Sheffield Ave., Chicago, Ill.

EVERY Ford Owner in the World Wants This! The Hauser Visible Vaporizer guarantees increased mileage (3 to 8 miles per gallon), more power (20% and better), quicker pickup, no carbon, smooth running motor, less heat, longer life, more driving comfort. Sells $4.50; your commission, $3. Exclusive territory. Details and proofs. Visible Vaporizer, Dept. 19, Chamberlain, S. Dak.

WANTED—Tailoring Salesmen, make $60 to $125 per week. Biggest merchants in many towns have started with our line. We are the largest made-to-measure tailoring house in the country, furnishing elaborate sample equipments, including 500 all-wool fabrics. You make your own profits from $8.00 to $15.00 on each order. Guaranteed absolute satisfaction, perfect fit, best workmanship, or no sale. Write for line and all accessories to be sent free. Tell us all about yourself. Address N. O. Perry, Sales Manager, Box 483, Chicago, Ill.

ASTOUNDING Invention. Fords use kerosene, start instantly. Mileage doubled. Big profit. Super, 1306 Fondulac, Milwaukee, Wis.

A WONDERFUL Seller! Any man, woman, boy or girl can make big wages. Some agents make from $8.00 to $20.00 per day. Crimp Grip Clothes Line Fasteners are a simple, time-saving device for holding a rope—also used for many other purposes. It pays for itself quickly in time saved on wash days. No knots—it fastens and releases quickly. Every home a prospect. Every housewife who uses Crimp Grips—and there are thousands of them—is a booster. There is but one Crimp Grip. Write for particulars, or send 50c for one pair and a mounted sample, with full particulars to agents. Crimp Grip Company, Belvidere, Ill.

WERE You Ever Offered a Grocery Store? Our proposition is better. You can handle flour, canned goods, dried fruit, coffee and entire line of groceries as well as radio sets, paints, roofing and automobile oils and tires with no rent to pay; no money invested, take large orders from samples. Goods are guaranteed and proven quality. Selling experience not necessary. Steady, profitable work for "workers." Address Hitchcock-Hill Co., Dept. 226, Chicago, Ill. Reference: Any bank or Express company.

DOES Your Trade Use Salesboards? Send for free catalog. Finest and largest ever published. Big commissions! Lincoln Sales Co., Dept. L, 212 N. Sheldon, Chicago.

BEST Seller. Jem Rubber Repair for tires and tubes; supersedes vulcanization at saving of over 800%; put it on cold, vulcanizes itself in two minutes, guaranteed to last life of tire or tube; sells to every auto owner and accessory dealer. Get particulars how to make big money and free sample. Amazon Rubber Co., Philadelphia, Pa., Dept. 510.

TRAVELING Salesmen calling on retail stores wanted by large manufacturer to sell unique line of business-boosting articles. Year round, fast selling, main or side line. If not earning $150 weekly, address Ebauer Works, 222 Charles St., Boonville, N. Y.

SALESMEN—Sideline pays five to ten dollars a day taking orders for Specialty printed gummed advertising and Match Box Stickers. Write for proposition, samples, etc., today. Beardsley's Printery, Rock Island, Ill.

$4.00 PROFIT on Every $5.00 sale. "Free Sample"—New Specialty. (Money Getter.) Every Storekeeper, Doctor buys quickly. Experience unnecessary. Territories open. Box 596, Hartford, Conn.

SALESMEN Can make $5.00 a day selling our Calendars, Pencils, Signs, Advertising Novelties, Yardsticks, Whistles, etc. Liberal terms. Sells entire year. Fine side line. Local and traveling agents. Model Calendar Co., Dept. 226, South Bend, Ind.

CALIFORNIA Rosebeads selling like hot cakes. Agents coining money. Absolutely new. Big profits. Catalog free. Mission Factory SP, 519 No. Halsted, Chicago, Ill.

SALESMEN—Saleswomen Build your own business. Sell direct from manufacturer to wearer. Big profits. All wool Boys' suits. Wonderful values. Liberal commission. Repeat business assured. Culver Tailoring Co., Miller Bldg., Cincinnati, Ohio.

SALESMEN sell sales and order books, auto, reg, rolls and bill ladings. Large demand. Liberal commission. Wirth Sales Book Co., Dept. PM, Chicago.

$60-$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

MAKE $100 Weekly in Spare Time. Sell what the public wants—long distance radio receiving sets. Two sales weekly pays $100 profit. No big investment, no canvassing. Sharpe of Colorado made $955 in one month. Representatives wanted at once. This plan is sweeping the country—write today before your county is gone. Ozarka, 802 Washington Blvd., Chicago.

SALESMEN—Become Independent. Own your business; experience unnecessary; selling our $7,500 Accidental Death, $50 Accident, $25 Sick Weekly Benefits; $12.50 yearly; other amounts proportionate. Guaranteed steady income from renewals. $250,000 deposited Insurance Department. Registration Dept. A, Newark, N. J.

HELP WANTED

MEN wanting forest ranger positions, $1,500-$2,400 year. Write for free particulars. Mokane, A70, Denver, Colo.

CLERKS: Railway Mail. Other good Government postal positions. $1,400-$2,300 yearly. Experience unnecessary. Full particulars free by writing G. W. Robbins, Civil Service Expert, 411 Burchell Bldg., Washington, D. C.

SEND for Proof of Profits—Free—New sales plan and detailed explanation how to go into business for yourself without capital or experience—$5 to $15 daily easy—spare time or full time—No delivering or collecting. Macochee Company, Station 4721, Cincinnati, Ohio.

EARN $25 weekly, spare time, writing for newspapers, magazines. Experience unnecessary. Copyright book free. Press Syndicate, 981, St. Louis, Mo.

MEN—Boys, 18 up. Travel—See your country. Become U. S. Government Railway Postal Clerks. Steady employment. $133 month. Raise to $195. Experience or influence unnecessary. Common education sufficient with our coaching. Full information and sample examination questions free. Write immediately, today sure. Franklin Institute, Dept. T3, Rochester, N. Y.

TRUSTWORTHY men wanted everywhere. Must live permanently in town. No experience or capital necessary. Honesty and faithfulness main requirements. Easy and pleasant out-door distributing. No selling or canvassing required. Write today. Dept. C, P. Freed, 5157 N. Clark St., Chicago, Ill.

HOTELS Need Trained Men. Nation-wide demand for high-salaried men; past experience unnecessary. We train you by mail and put you in touch with big opportunities. Big pay, fine living, interesting work, quick advancement; permanent. Write for Free Book, "Your Big Opportunity." Lewis Hotel Training Schools, Suite O-351, Washington, D. C.

FIREMEN, Brakemen, Baggagemen, Sleeping car, train porters (colored) $140-$200. Experience unnecessary. $10 Railway Bureau, East St. Louis, Ill.

SELL Us Your Spare Time for Cash. Salesmen—Make $130 monthly selling only one $10 policy a day! Policy pays $5,000 and $25 weekly for sickness or injury. Total cost $10 yearly. Easy to sell with our "Direct-by-Mail" plan. Underwriter, 702 Bonnell Building, Newark, N. J.

A SPLENDID business is yours making chipped glass number and name plates. Write for full particulars. Simplex Company, 136 West 21st St., New York.

GOVERNMENT positions; many vacancies annually. Liberal salaries. Lifetime employment. Information free. Chicago Civil Service College, A-14 Kesner, Chicago.

MEN: We will establish you in a permanent business paying big income. Your credit is good for merchandise people must buy every day. No special experience necessary. Write today for free booklet "McConnon's System." McConnon & Co., Factory M48, Winona, Minn.

BOYS — Men. Learn Auto Repairing. Earn $30.00 week. Sample lessons free. Franklin Institute, Dept. T-409, Rochester, N. Y.

Copyrighted material

LOCOMOTIVE Firemen for railroads nearest their homes—everywhere; beginners $150-$250 monthly; promoted, locomotive engineer, $3,000-$4,000 yearly. Best paying positions on railroads. Railway Association, Desk M1, Brooklyn, N. Y.

25c BRINGS samples and full information of Cooperators' Service, assuring work that pays Home Magazine, Nashville, Tenn.

MEN wanting forest ranger, railway mail clerk and other govt. positions. Write for free particulars. Mokane, Dept. A-12, Denver, Colo.

MAKE Money Silvering Mirrors. Autolights, Radiators, tableware, stoves. Outfits. Methods Free. Sprinkle, Plater, 287, Marion, Ind.

WANT a Government Job? Men—women 18 up. $95 — $192 month. Candidates coached. Particulars free. Franklin Institute, Dept. T-19, Rochester, N. Y.

$5 TO $15 daily easy—Your Pay in Advance—Introducing New Style Guaranteed Hosiery—Must wear or replaced free—No capital or experience required—Just show samples, write orders—We deliver and collect—Outfit furnished—All colors—grades including silks. Macochee Textile Company, Station 2601, Cincinnati, Ohio.

MEN to build radio sets in spare time. Leon Lambert, 529-H Kaufman Bldg., Wichita, Kans.

MEN, 18 up. Become Railway Mail Clerks. $1,600 — $2,300 year. Sample coaching lessons—free. Franklin Institute, Dept. T-19, Rochester, N. Y.

GET posted—Good prices paid for butterflies, insects. See Sinclair display advertisement, page 64.

BECOME a Landscape Architect. Unexcelled profession of wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Write for book. American Landscape School, 56-E, Newark, N. Y.

MEN wanting positions firemen, brakemen, colored train or sleeping car porters, write for application blank; experience unnecessary, first class roads, no strike. Name position wanted. Railway Institute, Dept. 33, Indianapolis, Ind.

GOVERNMENT Railway Postal Clerks, $133-$192 monthly. Many other openings, $1400 upward. Full information free. Write immediately. Chicago Civil Service College, A-41 Kesner, Chicago.

BECOME Railway Mail Clerks. $1,600—$2,300 year. Sample coaching lessons—free. Franklin Institute, Dept. T-19, Rochester, N. Y.

GET a United States Government Position. Good Pay, Short Hours, Vacation, Sick Leave, Pension, etc. Prepare for Railway Mail, Post Office, Custom House, Internal Revenue, Rural Carrier or other branches. Examination all the time. Common education sufficient. Let our expert (Former U. S. Civil Service Secretary-Examiner) train you. Guaranteed Preparation. Write today for Free Booklet. Patterson Civil Service School, Dept. 8, Rochester, N. Y.

MEN—Age 18-40, wanting Railway Station-Office positions, $115-$250 month, free transportation, experience unnecessary. Write Baker, Supt., 41 Wainwright, St. Louis.

FINGER Print Experts—Excellent paying positions; particulars free. Finger Print Headquarters, 188 East 79th, New York.

SILVERING Mirrors, French plate. Easily learned; immense profits. Plans free. Address, Wear Mirror Works, Excelsior Springs, Mo.

OUR genuine gold window sign letters are an excellent money-making proposition for handy men. Slann Sign System, Bethune Ave. E., Detroit, Mich.

MAKE money writing Photo-plays; details free to beginners. No correspondence course. Producers' League, 230 Wainwright, St. Louis.

INVENTORS desiring to secure patents should write for our book "How to Get Your Patent," tells our terms and methods. Send sketch for our examination and Instructions without charge. Randolph & Co., Dept. 418, Washington, D. C.

MEN 18—35. Become Railway Mail Clerks. Commence $1,600 year. Common education sufficient with our coaching. Particulars—free. Write immediately. Franklin Institute, Dept. T-19, Rochester, N. Y.

ALL men, women, boys, girls, 17 to 65, willing to accept Government Positions, $117-$250 traveling or stationary. Write Mr. Ozment, 101 St. Louis, Mo., immediately.

STORIES, poems, plays, etc., are wanted for publication. Good ideas bring big money. Submit manuscripts or write Literary Bureau, 522, Hannibal, Mo.

EARN $10 daily silvering mirrors, plating and refinishing metalware, autos, chandeliers, bedsteads, headlights. Outfits furnished. E. Decie Laboratories, 1133 Broadway, New York.

INFORMATION

INVESTIGATORS: Expert Guidebook Quickly Solves Tangled Irregularities. $1 Postpaid. Dorey, Publisher, 1443 Amsterdam Avenue, New York.

DETAILED, Expert Information, Advice, Any Subject. $1.00. International Information Institute, 15 Moore Street, New York.

COMPLETE information on any book published. Or will supply lists of books that are the best on any subject. Information is free. Room 807, Popular Mechanics Building, Chicago, Ill.

BUSINESS SERVICE

DELAWARE Incorporator. Charters; Fees Small; forms. Chas. G. Guyer, 901 Orange St., Wilmington, Del.

MAILING LISTS

NAMES. Especially good. Satisfaction guaranteed. J. H. Benson, Ellsworth, Wis.

RANCHERS, Stockmen make good customers. List $5 Per Thousand. Adv'g Matter Distributed. James Mathews, Twin Falls, Idaho.

TYPEWRITERS AND SUPPLIES

TYPEWRITERS: All Standard Makes, completely rebuilt—equal to new in every particular. Five Days Free Trial. We also offer a complete rebuilding service for present owners. Brand-new Underwood or Remington Portables at substantial reduction from list price. Our Prices are the Lowest on Quality Typewriters—because we sell Direct, on a Cash Basis. Write for complete Price List. Woodward Sales Co., Ada, Ohio.

TYPEWRITERS All Makes; real bargains; guaranteed. Dees Typewriter Sales Co., Ada, Okla.

UNDERWOOD Typewriters — only $3.00 down. Easy monthly payments. Low prices at less than manufacturers. 10 days' free trial. Rebuilt, all worn parts replaced. Just like a new machine. 5-year guarantee. Write for big free catalogue C-151. Shipman-Ward Mfg. Co., 1511 Shipman Bldg., Chicago, Ill.

TYPEWRITERS All Makes. Save one-half. Thoroughly rebuilt in our factory by the famous "Young Process." Fully guaranteed. Free Trial. We handle all standard makes. Cash or sold on easy terms. Write for Catalog. Young Typewriter Co., Dept. 5751, Chicago, Ill.

TYPEWRITERS—$20 up. Easy payments. Free trial. Paynee Company, Rosedale, Kans.

TYPEWRITERS, All makes, $15 up. Guaranteed. Write for our bargain price list and Free Trial offer. Department 16. Manufacturers Typewriter Clearing House, 193 N. Dearborn Street, Chicago.

TYPEWRITERS, all standard makes, $10 up. Fully guaranteed. Free trial. Write for complete illustrated lists. Northwestern Typewriter Exchange, 121 N. Francisco Ave., Chicago.

PRINTING, ENGRAVING AND MULTIGRAPHING

EVERYTHING Printed! Samples free. Franklin Press, B-32, Milford, N. H.

500 IMITATION Typewritten Letters $2.35 with Printed Heading. Price List Free. Carlson Co., 8743 Essex Ave., Chicago.

500 "NEARGRAVURE" printed Letterheads—Envelopes $4.75 postpaid. Solliday's, Knox, Ind.

SAVE Money! Get our prices on Letterheads or Envelopes and Save Money. Samples Free. John Sprinkle Company, Martinsburg, W. Va.

PRINT Your Own Circulars. Make inexpensive Press. Uses printers' type. Illustrated instructions 10c. Greenhalgh, 3009 Kenwood, Indianapolis, Ind.

LOOK!—We print 100 each, Letterheads and envelopes, 20 lb. bond, postpaid for $1.00. The Woodward Press, Dryden, N. Y.

250 EACH fine bond (8½x11) letterheads and envelopes, $3.00; 500 either, $2.75. 500 business cards, $1.90. Postage prepaid. Todd Printing Co., 15 East Second Street, Cincinnati, Ohio.

ALL Printing Prices Smashed. 5,000 Letterheads or envelopes $13.85. Samples. Quality Printshop, Marietta, Ohio.

250 BOND Letterheads, 250 Envelopes, $3.00. Samples. Midland Press, 543 West Hickory, Kankakee, Ill.

ATTRACTIVE Gummed Labels!!! Superior Rubber Stamps!!! Samples Free!!! Edward Harrison, "Printing," Baltimore.

100 STANDARD letterheads or envelopes one dollar delivered. Helle Printers, 4158 Gladwin, Detroit, Mich.

GOOD Printing—250 Letterheads and Envelopes — $2.50, delivered. 500 — $4.50. Business Cards, 250—$1.50. Cole Bros., 400 South Halsted, Chicago.

PERSONALIZED Checks. Your name and address on your bank checks gives you prestige, protection and instant identification. Four books (100 checks) beautifully printed on National Safety Paper (alteration proof) with genuine black or gray leather cover, postpaid, $1.75. Sample and booklet free. Crescent Calendar Co., Dept. B, Wyoming, Iowa.

"ARISTOCRAT" embossed business, personal stationery. Different. Reputation. Samples for Stamps. Apex Company, 261 South Main, Wilkes-Barre, Penna.

1,000 LETTERHEADS or Envelopes $3.00. Work guaranteed. Quality Printer, 120 Hamilton Ave., Trenton, N. J.

SPECIAL: 150 Letterheads, Envelopes or Post Cards $1.00. Price list free. Carlson's, 8743 Essex Ave., Chicago.

EMBOSSED Business Stationery. Samples for Stamps. Daniels Company, Pittston, Pa.

WE print Stationery, Booklets, Catalogs, Circulars. Samples. Commercial Press, Batavia, Ohio.

225 BOND letterheads, envelopes, billheads, cards, $1.25 each. Combination, $4.00. Economic Press, Leonia, N. J.

250 LETTERHEADS, 250 white envelopes, printed and mailed, $3.00. Samples printing free. Sunco, Mohawk, N. Y.

QUALITY Printing! Reasonable Prices! Send for Free Standardized samples and prices. Folders, Circulars, Catalogs our specialty. Ernest Fantus, 525 South Dearborn, Chicago.

GILT lettered Advertising-Pencils for you. Buy direct; save entire middleman's profit. Samples free (no agents). Address S. Musial & Co., 10-12 Lincoln St., Yonkers, N. Y.

BOND Letterheads—$2.00 per 500. Small size $1.50. Place, Harding, Mass.

MULTIGRAPHING. Prices lowest; let us quote. Printing. Walter Miller, Berwick, Pa.

PRINTING OUTFITS AND SUPPLIES

PRINT your own cards, stationery, circulars, paper, etc. Press $12.00. Larger $35.00. Job press $150.00. Save money—Print for others, big profit. All easy, rules sent. Write for catalog presses, type, paper, etc. Press Co., R-11, Meriden, Conn.

PRINTING Outfits, Presses, Type, Supplies. Stamp for Information. Nicholas, 120 High St., Boston.

PRINTING Outfits—Presses, type supplies, type novelties. Send stamp for catalogue. Model Press, York, Penna.

PRE-USED Printing Presses, Type and supplies. List for stamp. Popular Bargains, Richland, Pa.

DUPLICATORS AND DEVICES

STENCIL Duplicating Outfit — $2.50, $3.00, $4.00 Complete. Typewriting, Handwriting. Returnable. Primos Specialty Co., 3-M, Primos, Pa.

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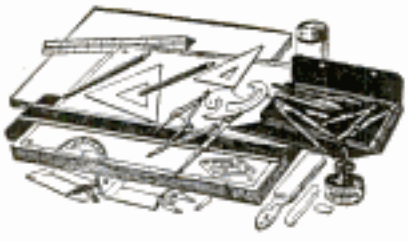

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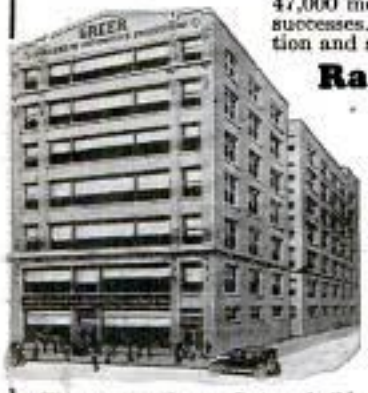

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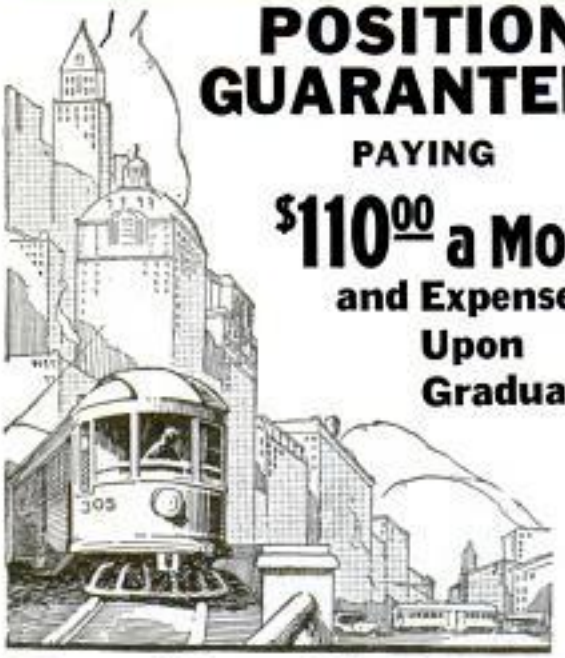

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In my 50-lesson home-study course on hotel work, all that the leading hotel experts know about the business—men making from $5,000 to $50,000 a year! My students are eagerly sought by the biggest and best hotels in the country. You won't have to start at the bottom. You won't have to look for a job. Big pay, fine living, free meals and apartment, fascinating work—these are only a few of the many advantages of hotel work.

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20 Years' Experience in 20 Weeks is what this wonderfully complete course gives you. Course prepared by Clifford Lewis, a hotel expert of national reputation. Endorsed by managers of such hotels as Biltmore, Waldorf-Astoria, Copley-Plaza, Commodore, etc. Interesting free book explains all. *Send for it today.*

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LEWIS HOTEL TRAINING SCHOOLS

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I PAY MEN $100 a week

Make $100.00 a week and up selling our fine made-to-measure, all-wool suits, direct to wearer. **Biggest values—positively sell on sight.** Biggest commissions paid in advance. We attend to delivery and collections. 6x9 swatch samples—over 100 styles all one price—furnished FREE. Part or full time men write at once.

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Lean an hour a day of your spare time to "Dash," formerly mechanician for Barney Oldfield. Big demand for "Dash" trained men. He will put you in the $100 a week class as Automotive Expert. Learn at Home—Learn by Job-Way Plan. Free tools. Success guaranteed. Free Book gives all details. Write today. No obligation.

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Are You Fitted for Salesmanship?

Hundreds of talented men and women are wasting their time, energy and the best years of their lives in positions for which they are not fitted. The highest salaried men in this country are men of only average ability who have found the right job. Let us help place you. We will test your qualifications and give you private written report by Salesmanship Expert with 27 years' experience.

Send No Money Details Free. Write Dept. 7

SALESMEN'S REGISTRY,
63 East Adams St. CHICAGO

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From $22.00 a Week Clerk to $85.00 Radio Expert

How a young man discovered his opportunity in a fascinating new field, and quickly prepared himself in his spare time for the position he wanted. As related by himself.

"I was interested in radio from the very beginning. I bought a little one-tube set when radio first became popular and I experimented with it, bringing in snatches of song from the air and trying to get distant stations. But my set was very much of a mystery to me. Like most people, I knew how to use it, how to tune in on local stations, but I did not understand how it worked. I often wondered.

"At that time I was working as a clerk in a large mail order house. I took the position because I thought it would be a stepping-stone and that I would quickly advance to something bigger. But years went by—and I was still a clerk. Somehow I had fallen into a rut, and there I remained. I used to get terribly discouraged at times, and I wondered what my future would be. Would I never be anything more than just a clerk?

"Then came the big radio boom, and everybody began talking about the wonderful new industry. Half the people in our town bought receiving sets. On the trains I heard nothing but radio gossip, and the newspapers were crowded with news on radio development. I had a sudden idea—an inspiration.

"Here was an industry that was still an infant compared to other industries. It was young and fast-growing, and evidently would some day be one of the greatest industries in the world. Surely in so new and important an industry there must be big opportunities for beginners—a rare chance for quick success and rich rewards. I would get into the field at once, start at the bottom and grow up with it! I would get out of the rut into which I had fallen, into a new field ripe with opportunities!

"But how? I had to depend too much upon my $22.00 a week to give it up. If only I could study radio at home in my spare time, and prepare myself for a radio job without giving up my regular work. I decided to make inquiries, and discovered that just such a course was offered by the National Radio Institute in Washington. I enrolled, keeping it a secret from everyone at home.

"For several months I studied at home, in the evenings and whenever I could spare a half-hour or so. The time passed quickly because it was so fascinating. In a few months I had mastered what I had believed 'the mysteries' of radio, and was qualified to take a position in charge of a radio department in a large wholesale house.

"How surprised everyone was when I announced calmly—and I'll admit a little proudly!—that I had graduated from the National Radio Institute and that I had my certificate as a radiotrician. They were even more surprised when I told them that the Institute had found a position for me right in my own town at $50.00 a week! They all wanted to know how I did it—and some of the fellows were mighty jealous.

"Advancement came quickly, and now I am a radio engineer earning $85.00 a week. I expect another promotion soon and it will not be long before I am earning $100.00 a week.

"I am glad to write this story for publication because the National Radio Institute alone has made my success possible. It offers the absolutely complete course now being given which qualifies you for the Government first-class license and for the big-pay jobs in Radio. I would advise anyone who is interested in radio as a profession to use this coupon and send at once for the valuable information that is offered free. Don't hesitate to use it—there is no obligation. I, too, sent off for the free information before enrolling. Why don't you do it—now?

SPECIAL OFFER

"A special reduced rate is being offered to those who mail the coupon AT ONCE. Get in on the ground floor and save money. Just address the National Radio Institute, Dept. 15CB, Washington, D. C."

NATIONAL RADIO INSTITUTE,
Dept. 15CB, Washington, D. C.

I am interested in radio as a profession. You may send me, free and without obligation, your interesting little book "Rich Rewards in Radio" telling about the future of radio, and all information about your spare-time, home-study plan and your free employment service.

Name.....Age.....

Address.....

City.....State.....

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I WILL MAKE YOU
NO EXPERIENCE

EARN $2,000 TO $10,000 A YEAR

Why take small pay from uncertain jobs? Why be knocked around from this to that, and not know whether you are going to have a job tomorrow or not? You can change all that. **Trained Auto Men Are Wanted.** Learn how to repair autos right. Make big money as a skilled man. Pave the way for a business of your own—a business that can make you independent for life. You can do it with a few weeks' training at my School—the **Michigan State Automobile School**—the great auto-trade school in the heart of the auto industry. Write me today about yourself and your plans and what you have been doing. I'll show you how to get out of the rut and win success!

A. G. Zeller
President

Be a Trained Man—Successful!

Fellows just like you step out and make great successes. Trained men are wanted all the time—everywhere! More than 15,000,000 autos need service and repairing. Millions of tires and batteries to be kept in commission. More men needed for good jobs. More garages—more electric service stations—more tire-repair shops—welding shops—battery stations needed. This means amazing opportunities for the men who start now. Fit yourself to win a good job, or to start a business of your own. Very small capital is needed. You are right at the door of big money if you decide now to make this your business.

LEARN AUTOS, TRUCKS AND TRACTORS IN THE HEART OF THE INDUSTRY

Without any previous experience—**just a liking for** mechanics—you can learn the auto business from A to Z in a few weeks here in Detroit—the heart of the industry. Then step out, equipped with knowledge and training, to a future of certain, big money making. You have big advantages, learning the business here. It's the fountain head of the auto business. You are taught under factory endorsed methods. You learn both theory and practice on latest equipment. Go through the great Ford plants. Visit the other auto factories—learn their methods first hand. The Michigan State Automobile School, in Detroit, the auto center, is the logical place to learn the auto business.

LEARN IN A FEW WEEKS—START NOW

A thorough training in Detroit, at the "Michigan State," fattens your pay envelope if you are working for others, or puts more profit in business for yourself. **You can take a full Automotive Course in 12 weeks, or my big "Master Course" in 30 weeks.** Or specialize in any one of its money-making branches; you can be an Auto Electrician; a Tire Expert; a Battery Service Man; a Repair Man; a Welder; a Machinist; or Tractor Specialist. Free Course in Garage Management, Business Methods and Selling included. Classes are always open. Jump on the train for Detroit and get started now.

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"We do not know of a better automobile school than the MICHIGAN STATE."

HUDSON MOTOR CAR COMPANY
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"This school is thought very highly of by the automobile men of Detroit, and is considered one of the best equipped and most efficient schools in the country. You will make no mistake in attending the M. S. A. S."

MICHIGAN STATE
301 Auto Building **Detroit, Michigan**

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A BIG MONEY MAN REQUIRED

Good Positions Open

The demand for trained men is greater than the supply. Look into any garage—everybody is busy as bees, have more work than they can do. Men working overtime, all at extra pay. That means big money for repairmen and boss. These money-making opportunities can be yours too, with "Michigan State" training. The years ahead are predicted to be the **biggest years of the industry.** That means certain money-making advantages to men who start in the business **now.**

15,000,000 Automobiles in U.S.
70,000,000 Tires to be repaired.
15,000,000 Batteries,
15,000,000 Ignition Systems and only
50,000 Garages.

PRACTICE ON FINE NEW CARS

This is the new (1925) Oakland Six with four-wheel brakes, one of the many fine cars that are here for you to practice on. Here you learn on up-to-date, new equipment. All types of cars, engines, axles, transmissions, electrical systems. Other new cars and engines in our equipment are the new Packard Straight Eight with four-wheel brakes, Packard Twin Six, new Buick with four-wheel brakes, Cadillac Eight, Hupmobile, Reo, Oldsmobile, G. M. C. truck, Hudson, Overland, and many others.

Get Into This Big Money Business

Here is a chart of facts—authentic figures which point out the opportunities. If you are ambitious and seeking a money-making opening, here's your chance—a chance to cash in to a degree that will satisfy your highest aims.

Every year there are more autos, more trucks, more tractors. Every year adds to the money-making possibilities. You have ambition—**you want success.** Success is certain if you are willing to work for it, and **start with proper training.** You can have independence—be your own boss—stop plodding and get into work you like. You can earn big money, be prosperous, happy, own a home and a good car. We have graduates who have made as high as $10,000 in less than a year. These records may seem amazing, but they are true. It is all done through head and hand training at the Michigan State. **Decide now** to give yourself this training that will pay you big and establish you in a successful life work.

EARN WHILE YOU LEARN

If necessary we can assist students to secure part time work to help pay expenses while in School. Or work all day and take our evening course; many do this. It starts them to success. Ask for details, and explain your circumstances fully. We are here to **help you succeed.**

MAIL THE COUPON TODAY

Get all the interesting facts. Mail the coupon for information concerning your future that you must not fail to get. It's illustrated with photos of school equipment, and letters from graduates. It tells you how you can get a good paying job—how you can go into business for yourself with little capital. Mail the coupon or send us a postcard today. Write now.

(We do not enroll colored students, except for our Home Study Course.)

HOME STUDY COURSE FREE

You can start your course here any day. **Jump on the train for Detroit now.** If you can't come at once you can begin to learn at home by my new Home Study Method. Then come here later to finish. No extra charge for the Home Study Training. Write me for full information. Or use the coupon. This is your opportunity to get ahead. Act now.

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AUTOMOBILE SCHOOL

3729 Woodward Avenue, Detroit, Michigan

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Send me FREE and without obligation complete information about Detroit-training to make the most money.

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Street or R. F. D.....

City..... State.....

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"This Man Gets The Job"

"I am giving it to him because I know he will make good. He isn't as old as some of you other fellows but he's years ahead of you in knowledge and training.

"I wasn't particularly interested in him until I found out that he was studying with the International Correspondence Schools in his spare time. That's the kind of man we want around here.

"While you frittered away your time, this man was getting ready for a bigger job. And today he has his reward.

"I tell you, gentlemen, you cannot succeed today without special training. The best reference you can have with any employer is an I. C. S. diploma. It will get you farther than pull or luck. It enables you to get a job—to hold that job after you get it—to move upward to the job ahead."

HOW much longer are *you* going to wait before taking the step that will bring you advancement and more money?

It takes only a moment to tear out and mail that I. C. S. coupon. *Only a moment!* But it is the most important thing you can do today.

Right now is the time to take your pencil and make that first move toward success.

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 5666-D, Scranton, Penna.

Without cost or obligation, please tell me how I can qualify for the position or in the subject *before* which I have marked an X:

BUSINESS TRAINING COURSES

☐ Business Management	☐ Salesmanship
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☐ Personnel Organization	☐ Better Letters
☐ Traffic Management	☐ Show Card Lettering
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☐ Banking and Banking Law	☐ Business English
☐ Accountancy (including C.P.A.)	☐ Civil Service
☐ Nicholson Cost Accounting	☐ Railway Mail Clerk
☐ Bookkeeping	☐ Common School Subjects
☐ Private Secretary	☐ High School Subjects
☐ Spanish ☐ French	☐ Illustrating ☐ Cartooning

TECHNICAL AND INDUSTRIAL COURSES

☐ Electrical Engineering	☐ Architect
☐ Electric Lighting	☐ Architects' Blue Prints
☐ Mechanical Engineer	☐ Contractor and Builder
☐ Mechanical Draftsman	☐ Architectural Draftsman
☐ Machine Shop Practice	☐ Concrete Builder
☐ Railroad Positions	☐ Structural Engineer
☐ Gas Engine Operating	☐ Chemistry ☐ Pharmacy
☐ Civil Engineer	☐ Automobile Work
☐ Surveying and Mapping	☐ Airplane Engines
☐ Metallurgy	☐ Navigation
☐ Steam Engineering	☐ Agriculture and Poultry
☐ Radio	☐ Mathematics

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Street Address..... 3-6-24

City..... State.....

Occupation.....

Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada.

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enabled S. C. Snodgrass to make $225.00 in 7 days

If you are now selling or thinking of selling, investigate this wonder-working sales outfit showing America's greatest line of tailoring for men, in the most powerful order-getting display outfit ever put into the hands of a salesman. With this great line more than 3,000 men are now making $5.00 an hour and up. If you are ambitious and anxious to get ahead and make money and are willing to work and follow instructions, we'll take you whether or not you have had experience, whether you can give full time or only part of your time. Write today for the full facts about this proposition and its money-making possibilities. Address Dept. 501,

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Keynote To Popularity

Popularity is yours. Everyone will seek your company, if you play tenor banjo. Enroll for my course. I start you with an $18 professional gift tenor banjo. I am director of Glee and Instrumental Clubs at N. Y. University. My picture, diagram and phonograph record method is so simple you play immediately.

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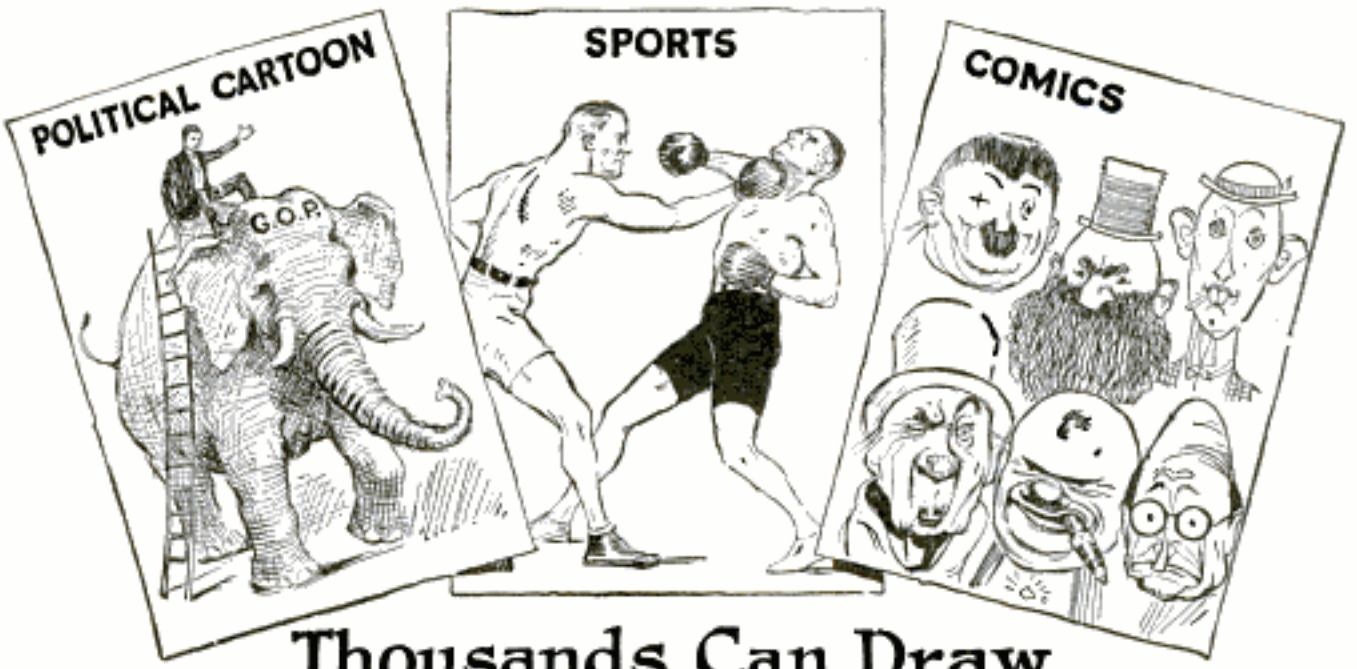

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Just watch a cartoonist work. A few little lines—a couple of simple curves—a splash of black here and there—and then you see a splendid cartoon before you. With a few strokes of his pen, he has taken some little incident of his day's experience—some humorous or sad scene he has witnessed—and produced a cartoon which tells the entire story to thousands of newspaper readers.

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Washington School of Cartooning
Room 301C, 1113-15th St., N. W., Washington, D. C.

Washington School of Cartooning,
Room 301C, 1113-15th St., N. W.,
Washington, D. C.

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City.....*State*.....

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Under our liberal plan, you pay down only 7% of the total purchase price—then use the land a year without even an interest charge, after which the balance of the principal and interest will be amortized on an easy payment plan of 34 equal payments. The second payment does not fall due until two years after purchase. On 160 acres costing $3,000, you pay down but $210. Your annual payments will be but $195.30.

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Try to buy a mower with your interest receipts. They are worthless! Put your profits back in your pocket—we don't want them. We want farmers—business men farmers—to build the country and fortunes for themselves.

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SAY Good-by to $20, $30, or $40 a week. Go after the Big Money! Work short, easy hours—boss the job instead of being bossed—be independent—*a Success!* I'll show you how: Listen! Give me a little spare time each day—I'll *guarantee* to make you a Big Pay Auto Expert—*get you a job and at least 50% raise in pay!* Mail the coupon today for my amazing guaranteed job and salary offer.

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My new SHOP-NOTE method of instruction gives you the full benefits of actual shop and garage experience, *right in your own home* — and with better results, quicker results! No need to quit your job until you're ready for a Big one! My training fits you to hold a dozen different auto jobs. I make you a MASTER of auto, truck and tractor. I make you a full-fledged EXPERT — not just a mechanic. I've been in the Auto business for 24 years — worked for Packard, Rolls Royce, Paige and others. I know how to train you and I guarantee your success.

Students Make Good!

E. R. Crowey, of Marion, Va., only finished the 8th grade in school, yet my training doubled his salary in 5 months. Carl F. High of Madison, Wis., is at the head of his own prosperous business. H. H. Orobor, 2220 Campbell Ave., Detroit, was advanced to Chief Engineer. I could cite scores of similar cases if space permitted. But the big point is this: What I have done for these men & hundreds like them **I can do for you.**

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Take my training. Then take your pick of a dozen big-pay jobs. I qualify you for Auto, Truck and Tractor repairing—Auto Electricity-Vulcanizing—Welding—Battery Work—Aviation Motor Service—Autosalesman—Shop, Garage and Service Station Management, everything.

Start In Business

I will show you how to start in a business of your own and take in $5000 to $15000 profits a year. I tell you how to organize, advertise and manage the business, how to get customers etc. Write today. Get the facts—the full PROOF!

Education Unneeded

I don't care what Education or Experience you have had. Crowey only finished the 8th grade and I doubled his salary in five months! My shop methods are guaranteed simple, easy-to-learn, and easy to apply. I've taken men and boys from all walks of life and made them experts.

Results Guaranteed

Write today. Get my free book, filled with proof of everything I say. Get my guarantee to make you a big pay Auto Expert—get you a job and at least a 50 percent raise in pay. These are money-back guarantees—not idle talk! WRITE TODAY!

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Enroll now and receive this valuable outfit of fine tools and precision instruments. Start making money quick with these tools. Pay for your course through spare time auto repair work. Mail the coupon for complete information. **Don't delay.**

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The American School, just like the best resident schools and colleges is chartered strictly as an *educational institution* and not as a money-making enterprise. This insures your getting the best Automotive Training at the lowest possible cost. 27 years reputation for integrity and square-dealing plus a million dollars in resources stand back of the American School and its guarantees to you!

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Send me your free book, your job and salary guarantee and full information on how you will get me a Big Pay Auto Job. This request is to put me under no obligation.

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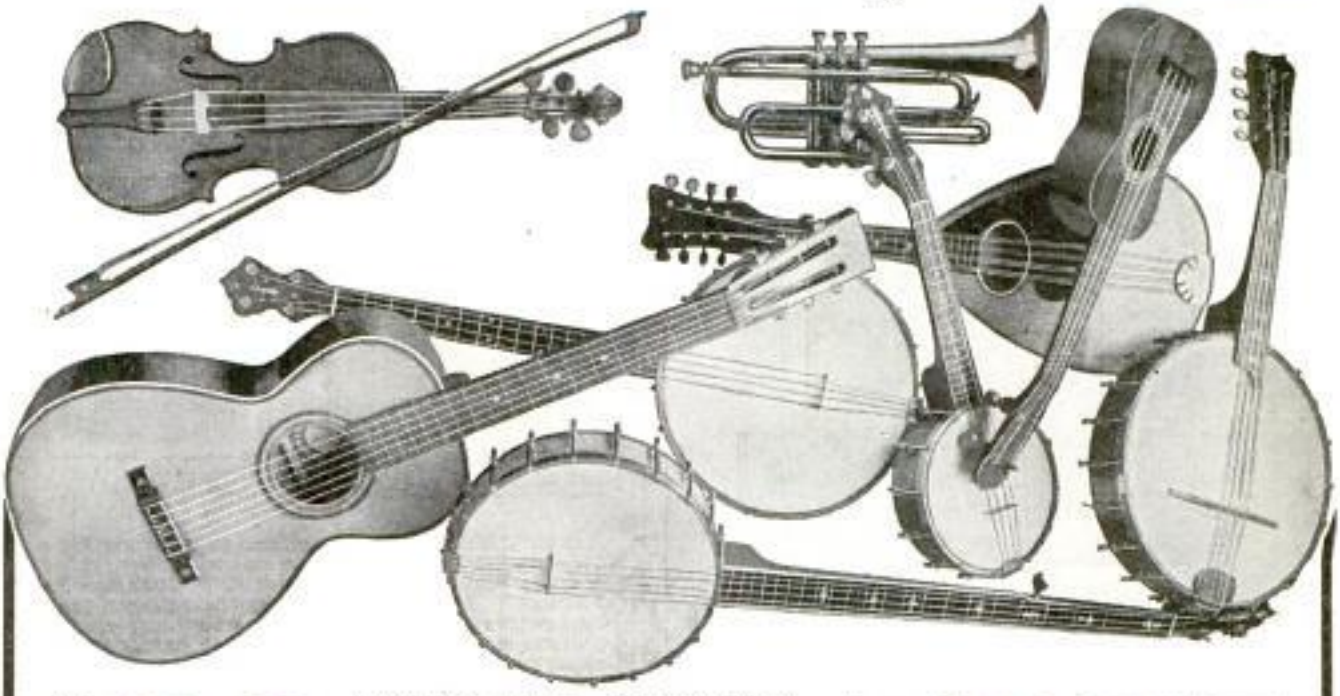

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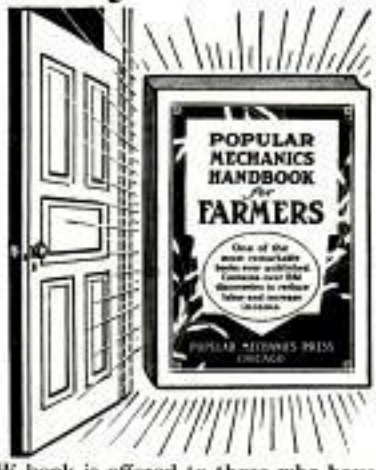

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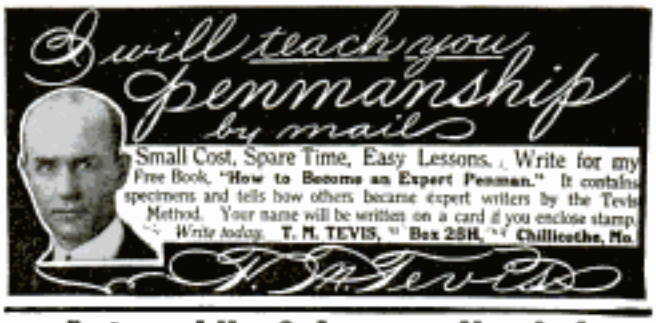

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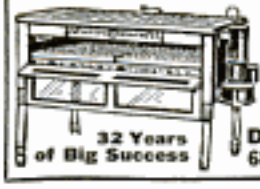

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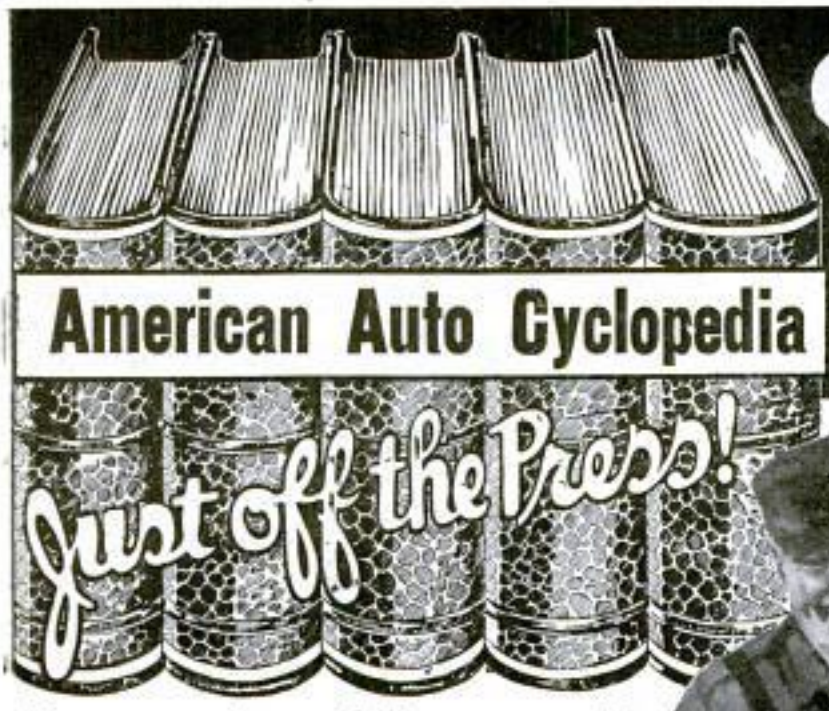

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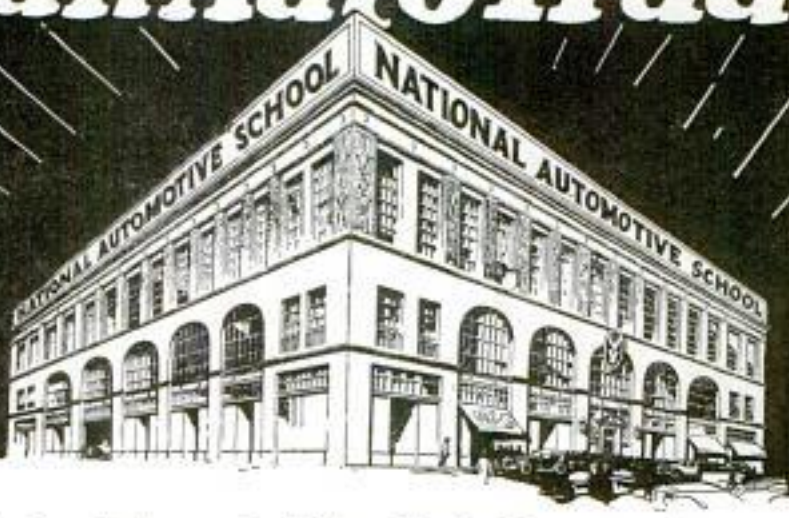

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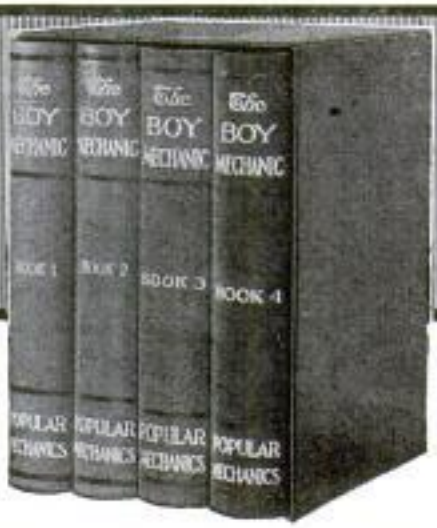

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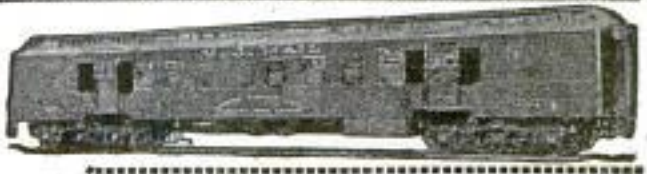

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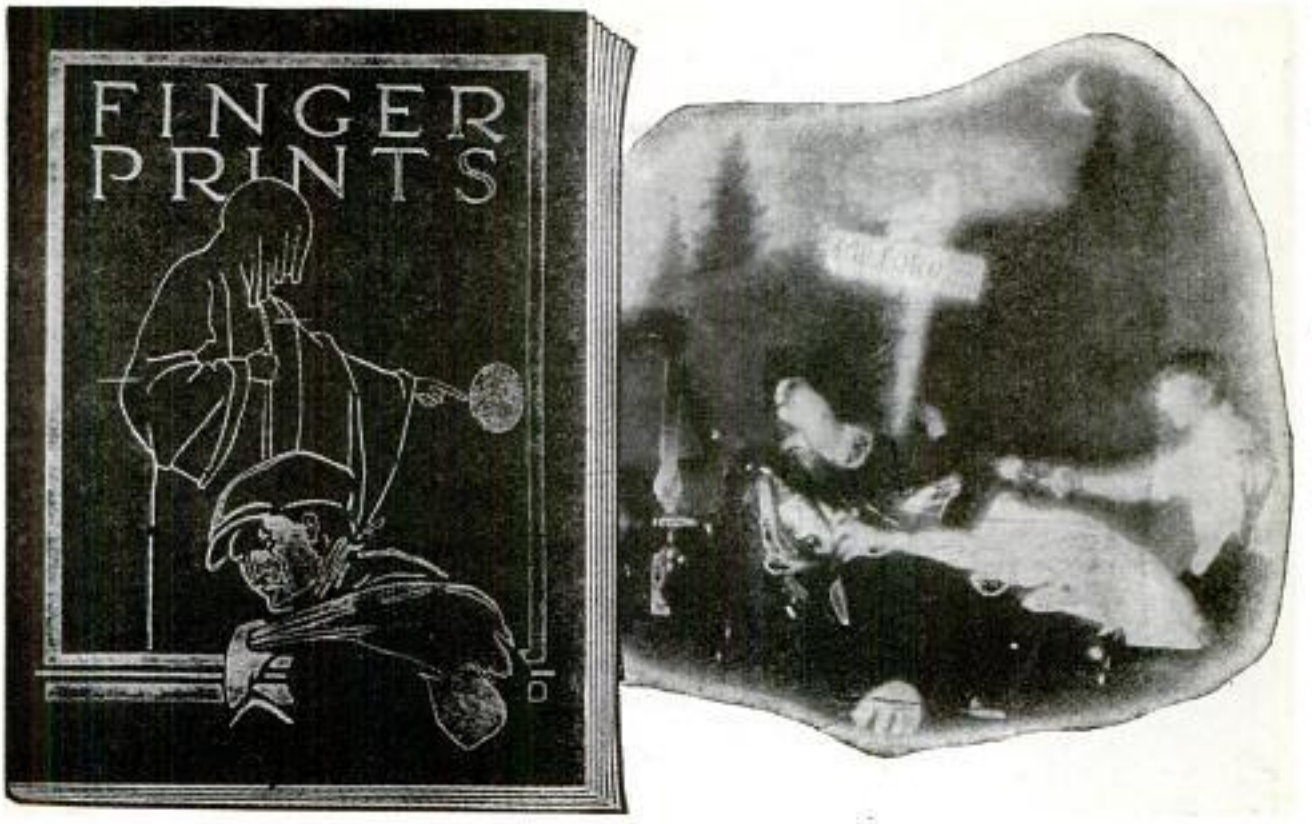

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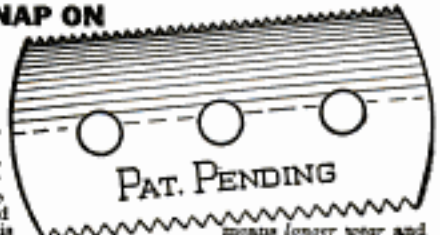

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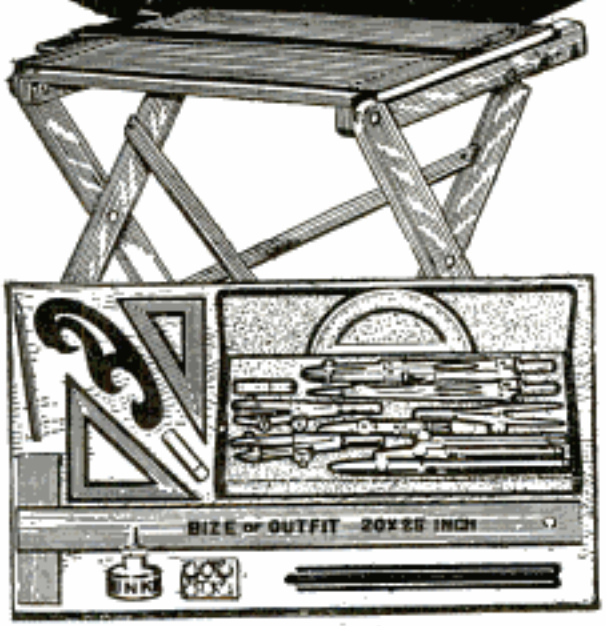

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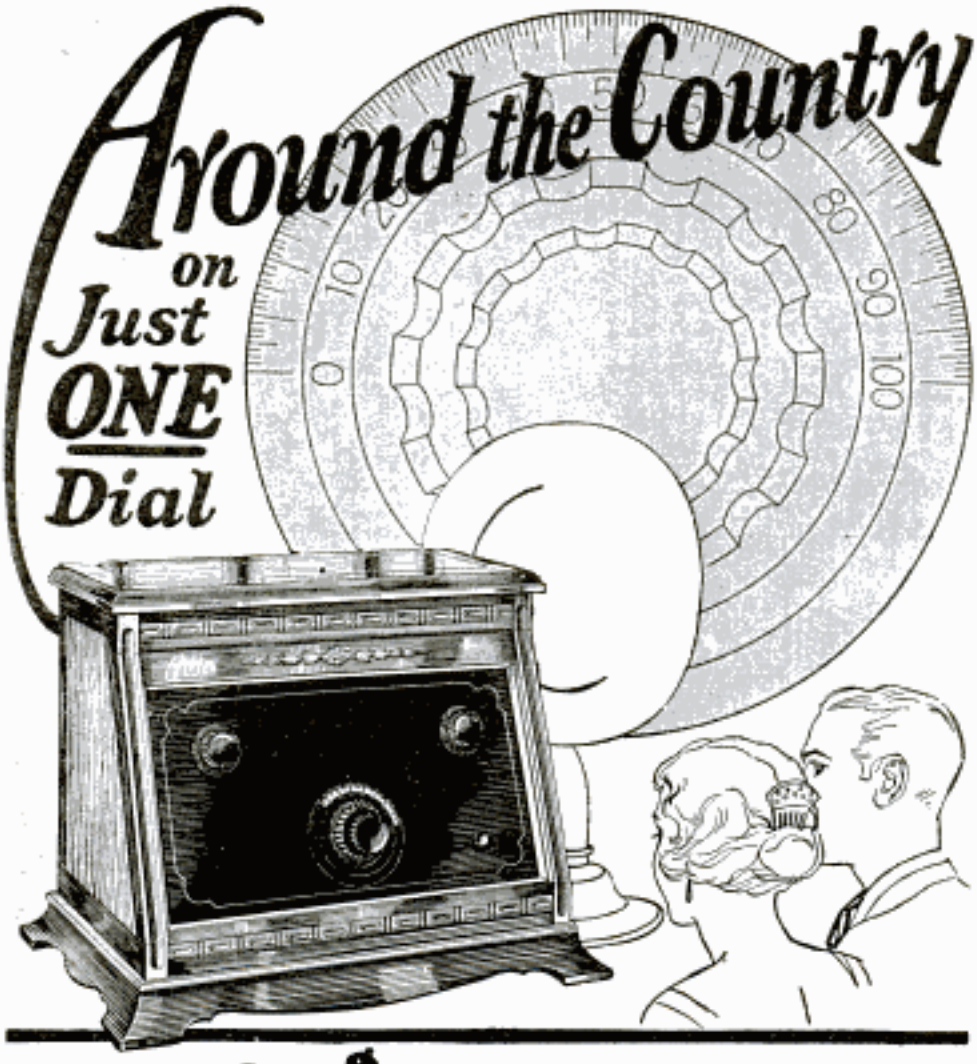

The Ideal Xmas Gift

Your family will experience the most wonderful Christmas of their lives if, on that happy day, the NEW Mohawk Receiver comes to bring the incomparable joy of REAL and DEPENDABLE radio into your home.

This is the new ONE Dial receiver whose fame has spread like wildfire. This is the simplified high power receiver which now puts the finest type of loud speaker radio into the class of simple, easy things that everybody can understand and operate.

With the Mohawk even small children and elderly people acquire expert skill almost instantly, and can tune direct on the loud speaker like radio veterans, cutting out the nearby stations and bringing in the distant ones from coast to coast.

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Never before in radio has there been such a sensational innovation. The wonderful new Mohawk employs the famous 5-tube principle which is everywhere recognized as the ideal big power for adequate loud speaker volume across the country. By using just ONE dial all the customary difficult tuning adjustments of ordinary sets with several complex controls are ENTIRELY ELIMINATED, and the resulting simplified performance EXCELS the best 5-tube reception that you have ever heard. Not one advantage is sacrificed. Selectivity, distance, tone, range and every quality of finest loud speaker volume are not only BETTER, but FASTER and EASIER as well.

Built in a distinctive type walnut cabinet the MOHAWK is as beautiful in appearance as it is dependable in performance. The Mohawk is also supplied in magnificent walnut console models with built-in loud speaker. It is the biggest improvement in radio construction in recent years. And every set is factory tested for distance and fully guaranteed.

We will gladly send you a descriptive folder telling all about this amazing ONE Dial Mohawk Receiver —FREE—on request. Use the coupon.

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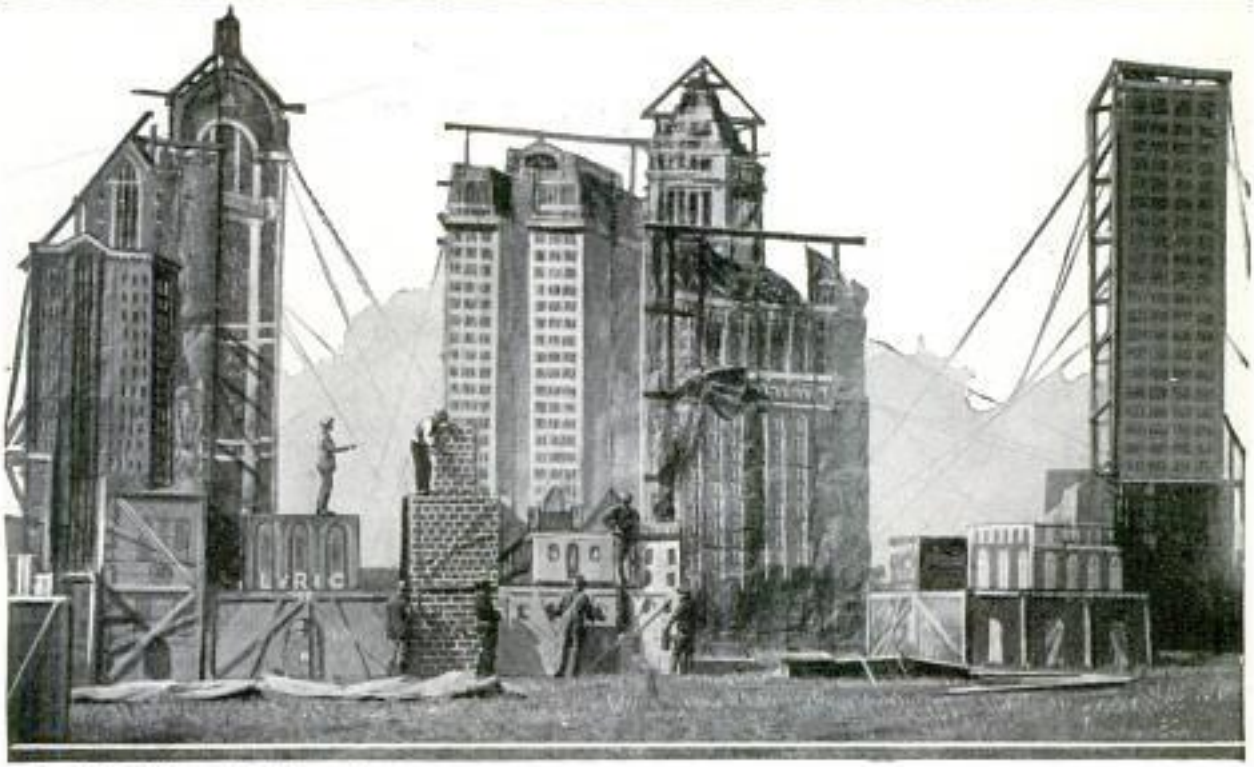
Vol. 43 1985 JANUARY, 1925 No. 1



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Setting Up "Properties" for Miniature City; with Airplanes Flying Low, the Small Structures Presented a Target Much like a Group of Real Buildings for Bombing Tests

How It Feels to Fly 300 Miles an Hour

By J. EARLE MILLER

As Described by Lieut. Corliss C. Moseley and Other Pulitzer Cup Winners

HOW does it feel to dive down out of the sky at 300 miles an hour or more in the tremendous burst of speed that sends a racing airship over the starting line, or to turn a pylon at 240 miles an hour, with your ship standing on one wing? Well, to begin with, everything goes black before your eyes for a few seconds as you make a turn. The blood rushes from your head. You have the sensations of dropping in a high-speed elevator. With the rush of blood you become dizzy, the sort of feeling one has when arising from a couch after lying down for a bit after a full meal. And in your ears, as you dive from the sky, there is an infernal popping as your eardrums protest against the change in altitude.

Lieut. C. C. Moseley

But in far less time than it takes to describe the symptoms, it is all over. The ship straightens out, as you automatically move the controls, and is away on a level course. The controls of an airplane are designed to synchronize with the natural reactions of the pilot. If you feel yourself falling forward you naturally lean backward to regain balance. So, in the plane, when you want to straighten out of a nose dive, you lean back and pull the control stick with you.

At the tremendous speeds attained by racing airplanes the controls become unbelievably responsive. Your automobile

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1985
2

steers easier at sixty miles an hour than at twenty, and in the same manner an airplane obeys its controls with greater ease as the speed increases.

With your ship on a straightaway you have no particular sensation of speed, as you do in riding in an automobile. The ship slips smoothly through the air without jolt or jar. We are accustomed to reckoning speed in relative terms. As you look out the window of a railroad car you judge your progress by the telephone poles flashing past, and the same thing is true in an automobile.

But in a racing plane you have no object from which to draw a comparison. If you look over the side of an airplane at the ground below it does not appear to be flying away behind you at any great rate. High in the air your circle of vision is broadened to cover so many square miles that it takes an appreciable time to pass over any given object you may see ahead.

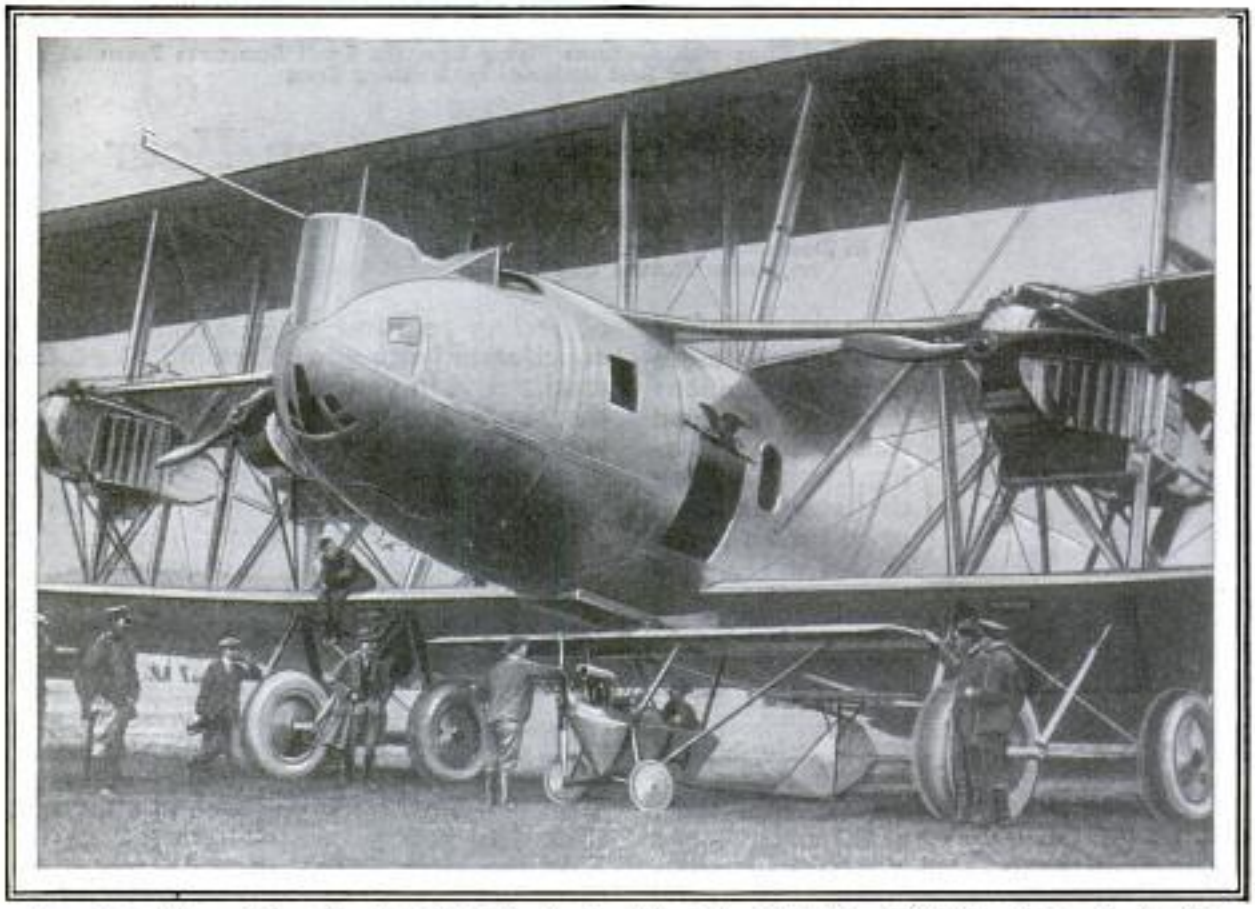
In your automobile you see a tree or a farmhouse a half mile ahead and calculate the time it will take you to reach it. In the airplane you can pick out an object ten or fifteen or more miles ahead. But when you dive out of the clouds to attain the enormous starting speed needed for a race such as that for the Pulitzer trophy, or turn a sharp corner at 240 miles to round one of the pylons that mark the corners of the triangular course, then you are fully aware of how fast you are going.

Of the two, the turning of the corner is the dizziest experience. If men ever reach a limit of racing speed beyond which they cannot go, that limit probably will be fixed at the turns of the course. A moving body has a natural tendency to continue in a straight line, and one's most intimate "innards" are no exception to the rule. When your automobile turns a corner the centrifugal force slides you across the seat.

Multiply your twenty-mile-an-hour speed around the corner by twelve and turn your car over on its side as it makes the turn and you have something of the sensation of rounding a pylon at 240 miles an hour.

Your heart and your arteries and your stomach are unequal to the strain. All of your working parts are badly jumbled. Blood that should be coursing through your head is pouring down into your legs. Your brain ceases to function for an instant and virtual unconsciousness comes.

Yet, through it all, the human mind unconsciously functions. The speed of the



How Latest Type of Giant Bombing Craft Overshadows Tiny Flyer Which Can Be Safely Sheltered under Big Ship's Wing though It Makes Great Speed in the Air

Built by E. Hormay
see P. February 1926 P. 188

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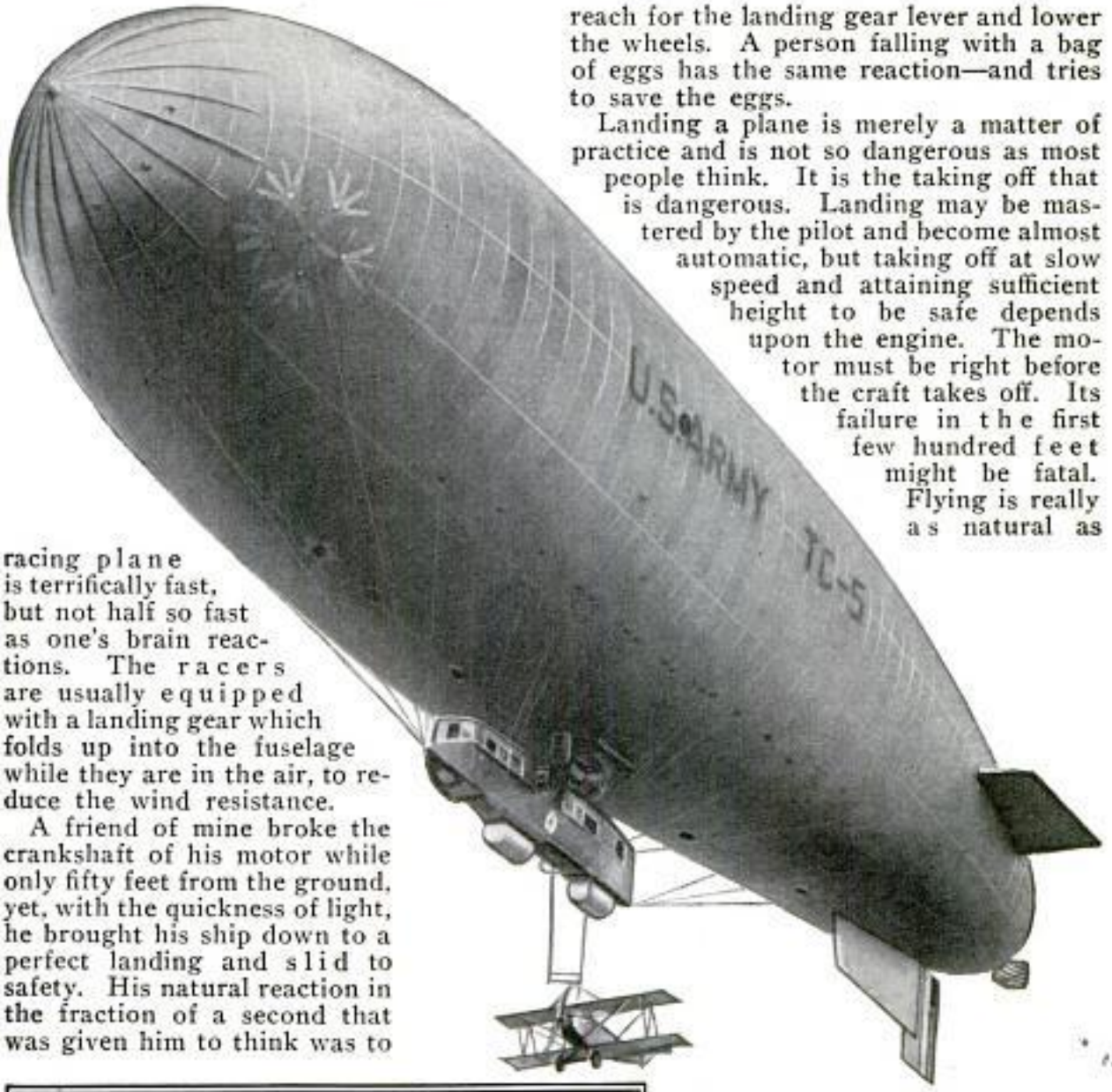
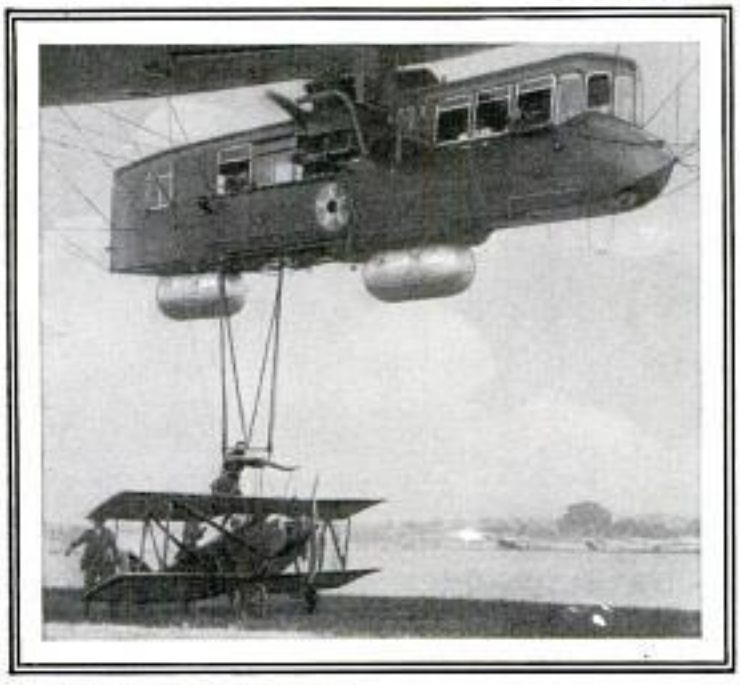
racing plane is terrifically fast, but not half so fast as one's brain reactions. The racers are usually equipped with a landing gear which folds up into the fuselage while they are in the air, to reduce the wind resistance.

A friend of mine broke the crankshaft of his motor while only fifty feet from the ground, yet, with the quickness of light, he brought his ship down to a perfect landing and slid to safety. His natural reaction in the fraction of a second that was given him to think was to reach for the landing gear lever and lower the wheels. A person falling with a bag of eggs has the same reaction—and tries to save the eggs.

Landing a plane is merely a matter of practice and is not so dangerous as most people think. It is the taking off that is dangerous. Landing may be mastered by the pilot and become almost automatic, but taking off at slow speed and attaining sufficient height to be safe depends upon the engine. The motor must be right before the craft takes off. Its failure in the first few hundred feet might be fatal. Flying is really as natural as walking. In the turns you may be likened to an intoxicated person who weaves and sways dangerously, yet, by some miraculous hidden sense, always regains his balance. One simply doesn't figure the difficult turn at all; he subconsciously keeps his balance just as if he were staggering along the street.

You who have as yet had no chance at flying need not despair for your time is coming soon. Five years from now there will be thousands of trained civilian aviators in the field. The life of the commercial airman will be a pleasant one.





"Blimp" Launching a Messenger Airplane It Carries Moored beneath the Cabin, and by Which It May Land Passengers without Descending; Below, Anchoring the Baby Ship to the Dirigible's Car

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Fine Wire Invisible to Unaided Eye to Help Surgeons and Electricians

What is believed to be the smallest wire in existence has been made in a government laboratory by George Taylor, a physicist in the department of agriculture. Although so slender that it cannot be seen by the naked eye, it is strong enough to support objects easily visible. It is expected that it will be of considerable service in the construction of delicate surgical instruments and for resistance thermometers, thermocouples and other electrical equipment.

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Testing Strength of the Fine Wire by Placing Small Objects on Suspended Strands

Thomas Jefferson as an Inventor, Gave World the Swivel Chair

Historians have written much of Thomas Jefferson as a president and statesman, but even if his life had not been so closely knit with the affairs of the nation, he might still be famous today as the inventor of the swivel chair. It created considerable amusement among his friends, who laughingly declared that he had built it so that he could see in all directions at once, and the newspapers of the day ridiculed it as Jefferson's "whirligig chair." Besides this article, which has brought comfort to many thousands of persons, he devised a table that he could slide over a couch to permit working while reclining, a bed that opened into two rooms at once, a clock that kept perfect time for more than 100 years, and personally planned and supervised the building of his home at Monticello, Va., considered a remarkable architectural accomplishment even today. A unique feature of the house was the clever way the passages and stairs were concealed so that the troops of servants necessary in those times were seldom conspicuous in passing to and fro. Jefferson taught his negro helpers carpentry and cabinetmaking and maintained his own factory, where pickaninnies were instructed how to make nails used in building his furniture.

Barrels Are Made from Paper

Winding barrels from a roll of tough "chip-board" paper is accomplished on a machine consisting of a cylinder, cut in two parts, which may be drawn apart on the axle to produce different lengths. The paper, passing through tension rollers and an adhesive-coating device, is wound for a predetermined number of layers, then a slitting wheel divides the paper, the cylinder halves are drawn apart, and an additional thickness of paper wound on in the center to provide the bilge.

Coaster Chair Steered with Feet Is Safe and Easily Carried

Said to be more easily operated and safer than an ordinary sled, a coaster on which the rider sits upright and which he steers wholly with his feet has been devised. It is strongly constructed of hardwood, shod with steel and braced with iron. The usual style has only one runner but two are furnished in those made for smaller children.

Ready to Slide on Single-Runner Coaster Chair, Using Feet to Guide and Balance It

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Here's New Use for Old Tires—as Bowling Balls on Outdoor Concrete Alley

Old Auto Tire Used as Bowling Ball Furnishes Outdoor Sport

2009

Using old automobile tires for balls, bowlers in a southern city have devised an outdoor variation of the usual game. A concrete alley and wooden pins, about the ordinary size and shape, are employed, but only one roll is allowed to a game. By sending the tire at the proper angle and without too much speed, a strike can be achieved and the casing is said to lend itself well to many experiments in curving the shots to increase the score.

2057

Reservoirs for the Storage of Dew Keep Farms in Water

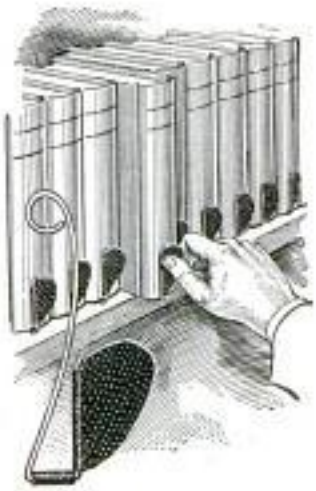
As a means of increasing water supplies for farms and dwellings remote from streams and pumping systems, dew reservoirs are being made to collect moisture from the air. Radiating surfaces of materials which keep cold under ordinary temperatures are placed above tanks built in elevated ground. As the moisture-laden air strikes these condensers, water forms on the sides and drips into the basins from where it can be piped when needed to any near-by point on the level land below. With an equipment of dew reservoirs, it is said, cisterns, troughs and similar containers require little attention to replenish.

Auckland News 9/25/24

Combination Bookmarker and Tab Saves Wear on Bindings

1828

Book bindings are kept from breaking and the volumes are more easily removed from shelves with the aid of an ingenious combination marker and tab which has been patented recently. Invented by a librarian who fashioned the device to meet an actual need, it consists simply of a length of strong, springy piano wire bent to fit under the bottom edge of the book back and between the pages. Held by a short arm that extends on the outside, is a flap of strong cloth which lies flat when the book is opened. The bottom of the wire is protected by a covering which prevents scratching the shelves or injuring the volumes. With this handy grip, which fits any size of book, it is not necessary to grasp the top of the back to pull the volume from the shelf, thus eliminating the danger of breaking and tearing.



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Wide World Photos
229 W. 43rd St.
New York City
New York Times
10/19/24

Soldiers of Stone in Battle Array Honor Dead of Two Nations

Topped by a trio of stalwart stone soldiers, depicted as though advancing to a charge, a massive monument to French and American heroes who fell in the Champagne sector during the World War, has been erected in France. The memorial faithfully reflects modern warfare in representing steel helmets, fixed bayonets and a hand grenade about to be thrown and also emphasizes a tendency in the sculpture of today to discard ornate and cumbersome symbols for trueness to life. The faces of the figures are said to have been modeled from actual war heroes and further significance is given in the Tricolor and the Stars and Stripes that float from the same flagpole near by.

Dedicating the Soldier Group Erected in Memory of French and Americans Killed in Battles of Champagne Sector

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Big spiders that devour small birds after catching them in trapdoor pitfalls, are reported to have been discovered in the Amazon valley.

Light and Power by Wireless Sure, Is Edison's Prediction

Transmission of light and power by wireless is surely coming, but there is "no cause to believe that it is immediately at hand," according to Thomas A. Edison. The great inventor made this observation on the occasion of a visit to an electrical show where he saw many devices made possible by his original discoveries. It was about forty-five years ago that he invented the incandescent lamp, and after seeing photographs of New York brilliantly illuminated at night, Mr. Edison remarked that the lamp had done much better than he thought it would when he had finished his first type.

Fireless Locomotive Run by Steam

Charged with water and live steam at a boiler plant before it is started on its tasks, a fireless switching locomotive that needs no tender and makes no smoke has been tested successfully. It is said to run two or three hours without recharging, a process that requires about twenty minutes. Economy is claimed in operating as no fireman is needed and the expense of cleaning smoke from the walls of adjacent buildings is saved.

Unburdened by Tender and without Usual Smoke, Fireless Switch Engine Run by Stored Steam, Taking First Test

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Nearing the End of Its Laundering, the Car Reaches the Polishing and Drying Crew Who Shine Every Part of It, Including the Top, with Chamois Skins

Auto Laundry Cleans Car Every Minute

Progressive Factory Production Principles Are Successfully Applied on Big Garage Wash Rack

designed by Virgil Cunningham

BY applying progressive production principles to the difficult and unpleasant task of cleaning automobiles, a remarkable laundry has been built where cars of all kinds can be washed at the rate of 720 a day or one every minute and a half. In less than fifteen minutes from the time the owner gets his claim check at the entrance, he receives his car back, dirt-free and shining.

This huge washstand occupies the 200-foot side of a garage, filling and repair station that is soon to include an auto-testing laboratory. The laundry proper consists of a well-lighted and ventilated lane with two parallel moving runways in the center, a receiving office at the entrance and a turntable at the other end, where cars are given a final drying and polishing before being driven back to the exit.

On each side of the car, as it passes along on the moving tracks, which are operated by a five-horsepower motor, is distributed a crew of thirty-two expert washers and cleaners in uniform, each of whom has a particular job to do. They work with cloths, chamois skins, brushes, hose, powerful sprays of steam and kerosene, to rid every part of the auto body, wheels and running gear of dust, grease and dirt during its eleven minutes' trip.

Having paid for the washing in advance, the owner is given a claim check and a duplicate is tucked into a celluloid-covered leather bag which is hung on the radiator cap by the receiving clerk, who also sees that the hood is tightly closed.

The car is then halted in front of a red stop sign on the floor. The forward wheels are already on the moving runways that start to pull it gently down the lane. The first worker steps to the running board, opens the car door and proceeds to blow out the dust and dirt that may have

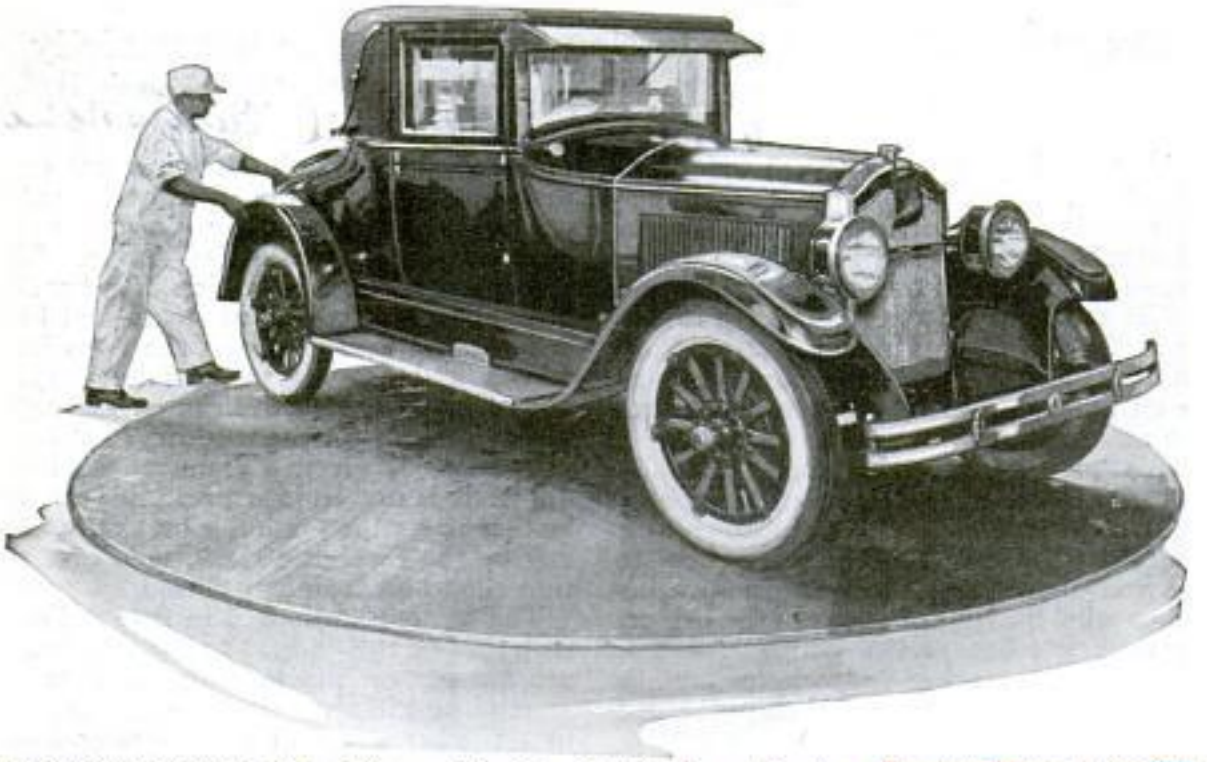
Copyrighted material

As Car Reaches Runway, Dust Is Blown from Interior by Blast of Compressed Air

gathered on floor and cushions with an eighty-pound air blast from a hose suspended from the roof. By the time this operation is finished, the car has reached a cascade of eight fine needle sprays of water, spurting out from pipes on each side at thirty pounds' pressure. The jets are curved to strike gently like falling rain upon the top and sides as well. They just miss the top of the tonneau, so that not a drop gets on the seats or floors of an open car with the curtains down. As the car is passing through the spray, another worker, standing upon a platform above, reaches out with a long-handled brush and cleans the top.

Now the scrubbing proper begins. When the car emerges from the shower, six men advance with hose and sponges. Two attack the car body, two begin on the front bumpers and the other two concentrate on the running gear. Next, a powerful spray of mixed steam and kerosene is applied at sixty pounds' pressure. This rids the running gear of accumulations of oil and grease. Then the wipers take charge, thoroughly drying all parts. Another attendant, from a platform and armed with a long brush and chamois swab, dries and shines the top while others polish the wheels, body and running gear. Before the car is run to the exit, it is placed upon a turntable for a final inspection and rubbing.

Behind the scenes is a compact power and heating plant equipped with two air compressors, two 1,000-gallon heaters to supply hot water, storage tanks for the emulsion used in washing the running gear, and oil-burning boilers cross-connected so that either or both may furnish hot water or steam. Dirt and water from the rack are drained separately, the liquid run into the city sewer and the solid material drawn off in special conveyors.



Having Run the Gantlet of Scrubbings and Sprayings, Auto Is Swung About on a Turntable Where It Receives a Final Polishing and Drying and Is Carefully Inspected

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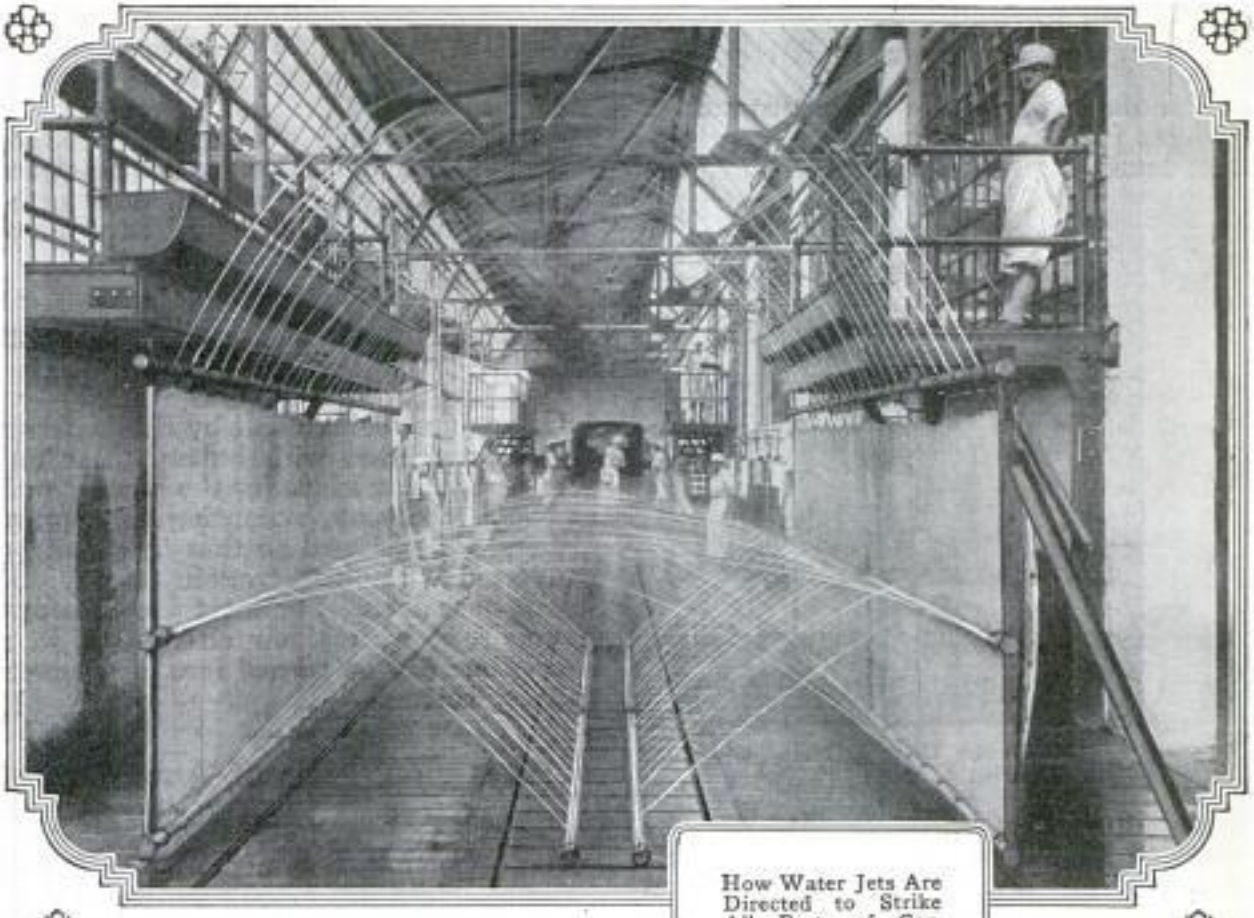

How Water Jets Are Directed to Strike All Parts of Car, and View of Washing Crew Spraying Running Gear with Emulsion Blast

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Focusing of Camera Is Made Easy by Pocket Distance Meter

For determining the exact distance of objects from the camera to insure a perfect focus, a combination meter and view

Sighting with the Pocket Distance Meter, and Close View Showing Eyepiece and Dial

finder has been devised. It may be screwed to the baseplate of the camera and used either in horizontal or vertical position and is said to give the ordinary outfit many of the conveniences of the reflex camera and as sharp a focus as can be attained with the aid of a magnifier and glass screen. It is a short, square tube, at each end of which are prisms. One of these can be moved by means of a disk which is numbered to show the distance scale. Through an eyepiece in the side, the field is observed, a double image of the object appearing within a bright circle. By turning the disk, the two images can be made to coincide. That point indicates the correct focus and the distance is shown by the numerals on the disk. The camera is then set accordingly. The instrument is also adapted for use on motion-picture cameras.

Live Eels Shipped to Europe

Eels freshly taken at the mouths of Canadian rivers are now being shipped alive in large quantities to markets of Germany and Holland where they are prized as articles of food. During one month more than 300 barrels of the fish were sent abroad by Montreal fisheries. Although an article of regular export to near-by American markets, it is only recently that transatlantic trade has been supplied with the eels. So rapid has been the growth of the demand for eels that exports from the Dominion for one year amounted to 1,367,600 pounds, valued at almost $100,000. A few years ago a consignment of 200,000 live eels was sent to New York in specially constructed barges equipped with openings through which sea water could constantly wash during the voyage. Generally, well iced barrels are used to hold the fish.

Powder Puff Is Hidden in Buttons in "Trick" German Dresses

Gowns now being made by Berlin dressmakers are fitted with buttons that unscrew, revealing space for the powder puff or the pocketbook, according to reports. Others are designed so that they can be converted with little trouble to suit different occasions. For instance, an afternoon dress, with a few alterations, in a short time can be turned into a gorgeous evening costume.

Spikes on Wheels of Automobile Serve as Mud Puller

A device that, it is promised, will pull an automobile out of any kind of a mud hole or give traction on the slickest dirt hill has been patented. The puller is simply a set of strong steel spikes, four of which can be locked around each rear wheel. When the hinged and folding halves are fitted into place they just fill the space between two spokes, giving a solid bearing surface which prevents slipping.

Puller Spikes Locked on Wheel, and One Open to Illustrate Its Construction

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2049 Westinghouse Electric + Mfg Co. East Pittsburgh, Pa.

Radio Controls Power to Light City

Wireless waves to operate electric switches controlling power supplied from a reserve substation at Tipton, Ind., have been applied to special apparatus that eliminates the need of attendants to perform the task during emergencies. In case of interruption to the regular lines, the operator in the main power house some miles distant sends out a series of radio waves which act on a pair of switches, closing the injured circuit and opening the flow of current from the reserve plant. Heretofore it was necessary to keep workmen at all times at the substation to whom instructions had to be transmitted by telephone. Heavy electric storms often interrupted the supply of current from the two regular feed lines which are used alternately to replace each other, and injury to the telephone system made communication with the reserve source impossible. Now, with the wireless system in operation, substitute power can be drawn from the reserve plant even should all other means of communication fail. When the radio-operated line is to be opened, the control operator dials a set of figures on an automatic telephone key connected to a radio transmitter. These impulses are received at the power switch by a radio set which multiplies their strength sufficiently to manipulate storage-battery controls that open and close the feeder circuits. A special wave length is employed in a series as complicated as the combination of a safe, so that the apparatus cannot be moved by any other similar means. So delicately is the receiving and control-operating set adjusted that, it is said, an arrangement of words spoken with certain inflections would move the switches.

Launching the Big Balloon Tire with Its Realistic, Painted Tread and Disk-Wheel Center; Hydrogen Tanks Made a Good Anchor

Big Balloon Tire Floated over City Three Hundred Feet in Air

2003

Aerial advertising made its appearance in an eastern city when a balloon shaped like a big automobile tire was floated 300 feet above the streets from an anchor on top of a building. The bag was twenty-four feet across, inflated with 3,000 cubic feet of hydrogen and was held with flexible cables attached to a windlass. The center was shaped to imitate a disk or solid wheel, and the tire tread was realistically painted in brilliant colored stripes intercrossing to form diamond-shaped sections.

Goodyear Tire + Rubber Co, Akron, Ohio

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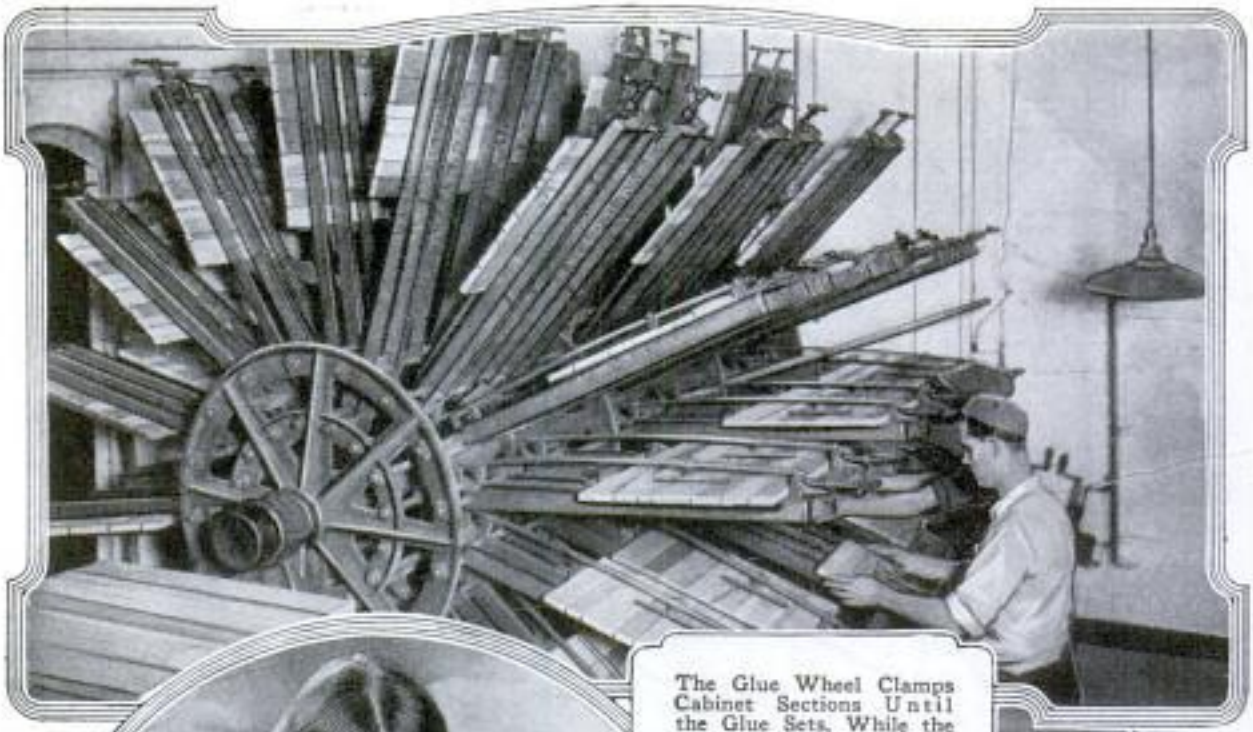

The Glue Wheel Clamps Cabinet Sections Until the Glue Sets, While the Panel Drill, Below, Drills Eleven Holes at Once

Deft-Fingered Girls Assemble the Book-Type Condensers (Above); the Inventor, at Right, Checks the Blueprints for a New Set, Soon to Be Placed in Quantity Production

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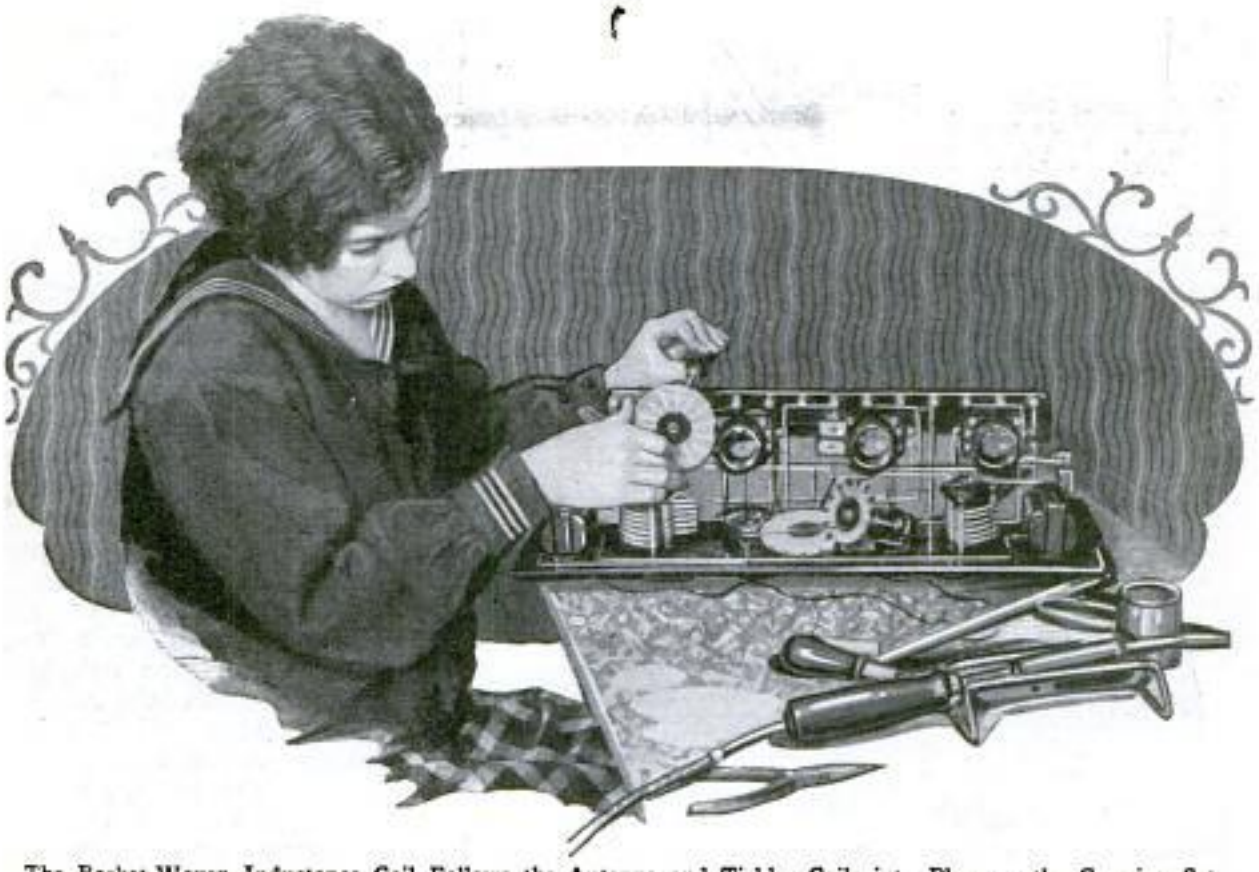

The Basket-Woven Inductance Coil Follows the Antenna and Tickler Coils into Place as the Growing Set Flits down the Long Assembly Table

Making Five Thousand Radio Sets a Day

Automobile-Factory Methods Are Adopted by Wireless Receiver Producer to Turn Out Outfits in Wholesale Lots

GIVEN a million and seven thousand radio parts, weighing nearly thirty-four tons, how many workers will it take to assemble them into 5,000 radio sets in one working day of nine hours?

This question has been answered by one great radio producer through quantity-production methods, whereby some 550 girls can assemble the thousands of condensers, transformers, rheostats and multistats on their panels and subpanels, place several hundred thousand screws and binding posts, solder something over a half million joints, and pass the completed receivers on to a few men who screw them into their cabinets, add serial numbers and instruction booklets and box the outfits ready for shipment. Starting at one end of a long table with a subpanel and a handful of binding-post parts—three parts for each post—the set moves down the bench with clocklike regularity until it comes out the other end, ninety feet away, complete, tested, and boxed and labeled. A one-tube set makes the journey from a handful of binding posts to a sealed carton with shipping label attached in forty-five minutes, a two-tube outfit in an hour, and a three-tube receiver in an hour and fifteen minutes. Each worker at that table has just enough to do to occupy her for three minutes. Radio outfits are assembled at the Crosley plant in Cincinnati on the same principle by which low-priced automobiles are made at Detroit. A few hours' instruction in the factory school qualifies a new employe to do the one simple task allotted to her. She may never learn the principles of radio or how to build a complete set, but doing the one easy stint over and over 200 times a day, the newest worker quickly acquires a skill that shames a veteran amateur builder.

Everything comes to the assembly tables ready for installation. Each piece of bus wire—and there are twenty-six pieces in the three-tube set—is cut to length and bent in the wire shop, which uses 1,200 pounds, or 60,700 feet, of tinned, hard-drawn copper wire daily. The twenty-six

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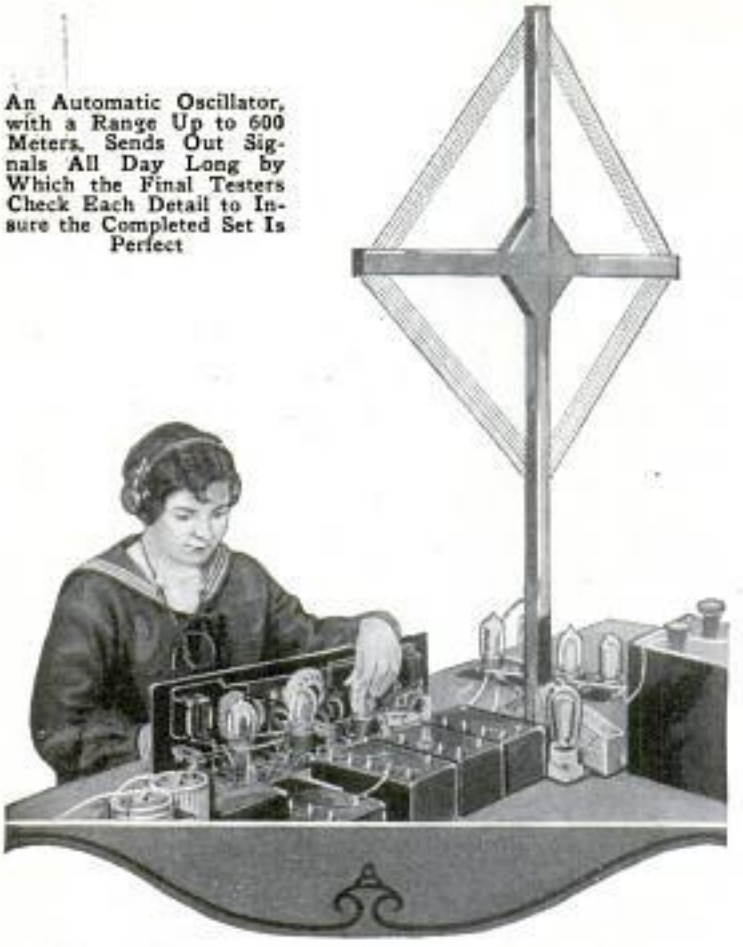

An Automatic Oscillator, with a Range Up to 600 Meters, Sends Out Signals All Day Long by Which the Final Testers Check Each Detail to Insure the Completed Set Is Perfect

pieces in the big set, ranging in length from one to twenty-four and seven-eighths inches, require seventy-five bends.

The company operates three plants and a printing shop. One factory turns out nothing but cabinets, using five carloads of mahogany and walnut and five carloads of poplar each week. Another plant makes electrical parts — transformers, multistats, condensers, coils, jacks, etc.— while the third factory is devoted entirely to assembling and shipping the completed receivers. Like the popular-priced automobile, these sets eliminate all the unnecessary frills, to stick to the original idea of marketing a medium-priced outfit. Engraving of the panel, for example, is expensive because of the labor used, so it is reduced to the minimum. Even then it takes three minutes to engrave the panel for a three-tube set and longer for smaller outfits, where there is no subpanel and all binding posts must be designated on the front of the set. The binding-post markings on the subpanel of the larger outfits are stamped by a punch press.

By dividing the work into three-minute units, hundreds of separate operations are performed on the three-tube receiver in the seventy-five minutes it takes to assemble it. There are sixty-nine connections to be soldered, and a total of 258 screws, binding posts and parts to be placed, including everything from the smallest washer to the cabinet, shipping carton, instruction sheets and shipping label.

When one of the larger sets starts down the assembly table the first worker deftly places the row of binding posts on the long, narrow subpanel, and at the end of her three minutes passes it on to the second girl, who mounts the tube sockets in another three minutes. Then the third worker gets the strip and assembles the plugs on the rheostats, mounts the cam which operates the book-type rheostat, inspects and whitens the engraving on a front panel and mounts the subpanel, with its posts and sockets.

The fourth step adds the jack and filament switch and mounts the assembled rheostats, ready for the next girl to add the coil bracket, phone condenser and tickler coil. So on down the line, the rapidly growing receiver moves. Here a girl puts on the first transformer and passes the work along to the neighbor on her right, who adds the second one; another girl adds the plate condensers; and then a whole row of workers—eight of them—begin adding wires and soldering the connections, each having just enough to do to occupy her for three minutes. Add an antenna coil, the tickler shaft, induction coil and black spaghetti insulation on some of the bus wires, the knobs for the rheostat and tickler shaft, and the growing set is ready for its first inspection.

The inspector checks the details of the assembly to make sure that everything is in place and then adds the barrel of the rheostat and checks the position of the indicating arrow on the knob, while her neighbor installs the knobs and dials of the plate condensers. Another mechanical test, and then the twenty-fifth girl slips the row of binding posts under a corresponding row of brass fingers, which automatically establish all the connections, and begins the final electrical test. In an adjoining room an automatic oscillator sends out signals all day long, ranging from 200 to 600 meters, to be picked up on the inspector's loop aerial, while she manipulates the knobs and switches to make sure that every circuit is correct and every part functioning.

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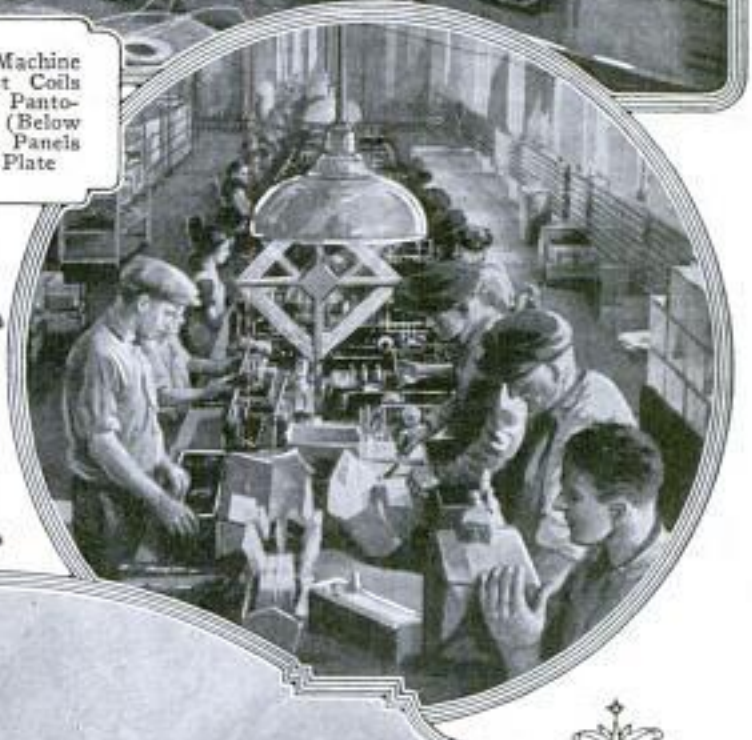
Crosley Radio Corp. 1997
Alfred J. Cook
Cincinnati, Ohio.

An Automatic Machine Winds the Basket Coils (Above), and a Pantograph Engraver (Below at Left) Marks Panels from a Master Plate



The Shipping End of One of the Long Assembly Tables, Each Side of Which Turns Out a Set Every Three Minutes, and (Below) a Soldering Job on One Subpanel Connection

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199 7
Committee on Public Relations, Eastern Railroad Bulletin 10/3/24
143 Liberty St, New York

Past the test, and another nine minutes suffices to mount the set in its cabinet, add the serial numbers, instruction sheets and booklets, box the receiver in a corrugated-cardboard carton, seal the joints with paper tape and paste on the label. Each of the tables averages around 200 sets a day. Most of the parts are made by the company, the principal exceptions being the molded sockets, dials and knobs. The parts factory and assembly unit use 15,000,000 screws and 25,000,000 nuts each week in building 5,000 sets a day, as well as 360,000 binding posts. The quantities of the small parts are so great that automatic computing scales are used to weigh them out of the bins, requisitions for hundreds of thousands being translated into pounds. Seven and one-half tons of formica panels—a total of 2,500,000 square inches—must be cut, drilled, engraved and polished each week for the 30,000 panels and 15,000 subpanels. The parts plant is expected to turn out weekly 60,000 book-type condensers; 75,000 multistats; 75,000 completed sockets; 75,000 basket-weave coils, and some 36,000 audio-frequency transformers. The latter use up 360,000 silicon-steel laminations, each about three inches long, and keep five punch presses busy turning them out.

A recently developed motor-driven automatic machine is used to wind the lattice turns of the basket weave on the inductance and tickler-coil "spiders," stopping automatically after specified numbers of revolutions for the operator to draw out the various tap leads. The new machine replaces hand-turned coil winders with which the operator was required to keep a mental count of the turns made.

Careless Auto Drivers Are Blamed for Most Crossing Accidents

1975

An analysis of 682 grade-crossing accidents involving ninety fatalities and 150 injuries on the Pennsylvania railroad during a four months' period is said to indicate that careless driving and not speed of the trains or defects in the cars is the chief cause of automobile mishaps of this kind. Of the total number of accidents, 487 occurred in daylight and 195 at night, while sixty per cent of the trains involved were running at less than twenty miles an hour. Seven fatalities and seventeen injuries were due to attempts of the drivers to beat the trains to the crossings, and only sixteen accidents were attributed to defective automobile brakes. There were 280 cases of automobiles running through or into the crossing gates without hitting the trains, and seventy instances were recorded when they actually smashed into the side of passing trains. Fourteen deaths and twenty-two injuries resulted from the latter cases.

The Wire Benders Turn Out Thousands of Pieces Each Day, All Cut and Bent Ready to Be Soldered in Place; 600 Pounds of Wires a Day Is Not an Unusual Output

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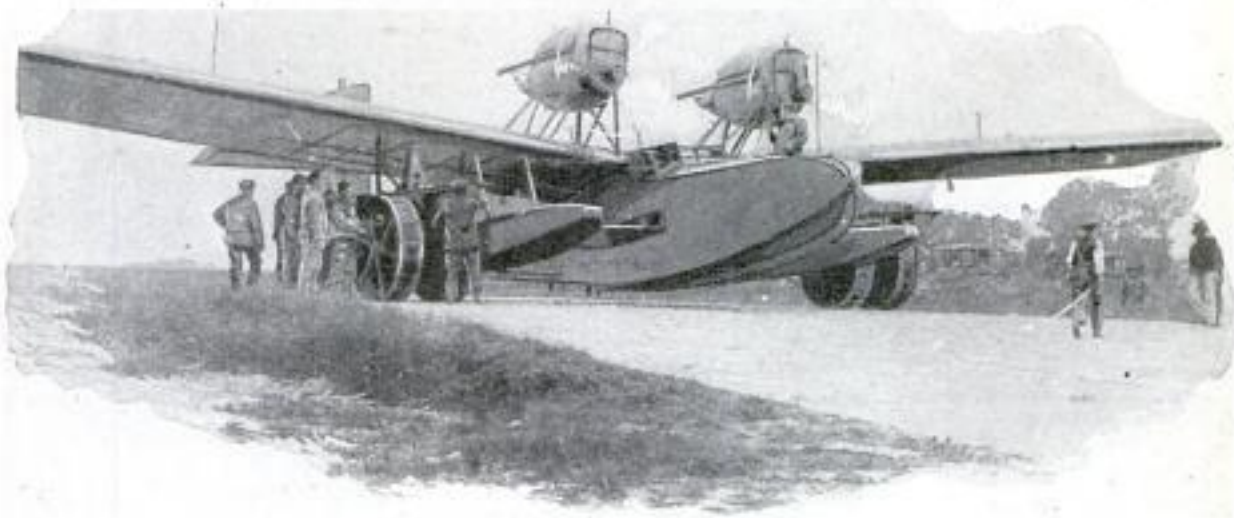
1875 Wide World Photos, 229 W. 43rd St. New York City



Japan's Huge Coast-Guard Monoplane, an "Armored Cruiser for the Skies," with Propellers Spinning, Preparing for a Take-Off in Final Test in Denmark before Shipment

Giant Armored Monoplane to Guard the Coasts of Japan

Covered with bullet-proof armor and equipped with two powerful motors, a giant monoplane has been shipped from a German factory in Denmark to the Japanese government after a test flight. The huge single-winged ship is expected to be used when sea-patrol work is necessary. It is said to be capable of great speed and, because of its protecting plate, can approach vessels that may be armed with anti-aircraft guns much closer than would be safe for ordinary flying machines.

Motorized Chain Hoist Operated at Touch of Finger

1873

Combining an electric motor and an ordinary chain lifting block, a hoist which can be set in operation at the pressure of a finger on the control "trigger" has been designed to eliminate hand work when raising loads. In case current is not available or has been temporarily shut off, the chains may be quickly applied and the device worked by hand power. Where needed, overhead track can be provided permitting the movement of the hoist over wide limits with heavy burdens. Hung like the common type of chain lift, the motorized hoist can be plugged in on any near-by light socket and prepared for work in a few seconds. In addition to accomplishing its tasks in half the time required by hand operation, the hoist motor is said to result in less wear on the working parts. The implements are made in several sizes, those capable of lifting a ton or less being sufficiently light to be carried about with little difficulty. Overloading is prevented by a protecting device which also keeps the hook from being run all the way up during a lift.

1119

Candy Is Kept Fresh in Display Jar with Top Pad and Lower Door

Candy-vending and display jars with a wide opening for the scoop at the bottom and fitted with an absorbent pad in the top to keep the goods fresh, have been placed on the market. The contents are prevented from flowing too freely or falling out of the lower door by a baffle plate attached inside just above the opening which is quickly closed at a touch of the spring door. The jar is easy to fill and the top feed prevents accumulation of old stock. It is never necessary to touch the candy with the hands, the jar has rounded corners which facilitate cleaning, and clear crystal glass insures an effective display.

Chicago Glass Products Co. 504 S. Green, Chicago

17 lb. 85.90
12 " 5.40
7 " 4.90

Motorbloc Corporation
Summerdale, Philadelphia, Pa.

~~E. M. Stevens & Co.~~
~~R. 1737 140 S. Dearborn, Chicago~~

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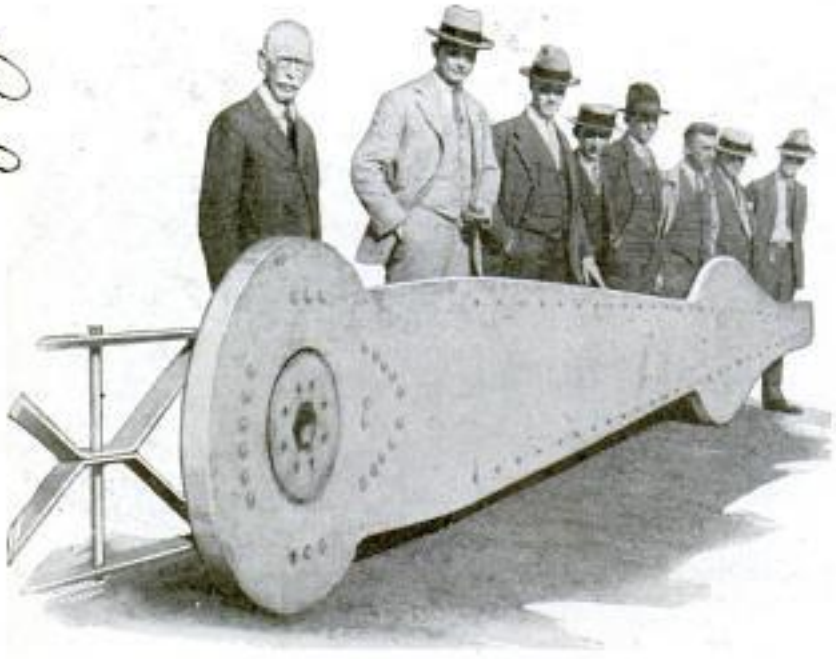
Clock's Minute Hand Weighing Ton Is Twenty-Seven Feet Long

Weighing nearly a ton, the twenty-seven foot minute hand for what is said to be the largest clock in the world, a gigantic timepiece in the east, required a whole flat car when it was shipped from the factory to its destination. Patterned closely after an ordinary watch hand, the huge pointer was carefully constructed and its weight proportioned to the fraction of an ounce in order that the accuracy of the clock's mechanism would not be impaired. The tip of the hand in an hour's time, travels approximately 157 feet around the big dial, which is visible for a considerable distance. The clock replaces a former instrument which in its day was reputed to be the world's largest.



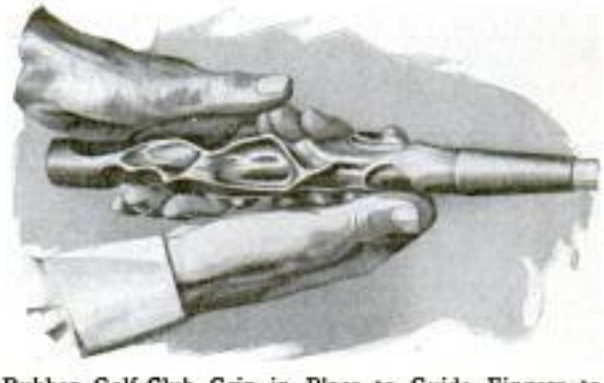
Eight Men in Line Illustrate Tremendous Proportions of Minute Hand of Huge Clock That Tells Time for Whole City

Six-Hundred-Mile Voyage on Iceberg Saves Shipwrecked Sailors

One of the most amazing voyages ever taken has been credited to the courage and hardihood of twenty-one Danish explorers who are reported to have floated 600 miles to safety on an iceberg after their ship had been crushed in polar seas. The daring adventurers were the crew of an expedition sent to Greenland in the "Teddy," a stanch little craft that, in spite of its sturdiness, cracked when caught in an ice pack. Water leaked in too fast for the pumps to keep it down. Drastic measures were necessary. The crew removed the deckhouse and stores from the ship and embarked upon a 300-foot iceberg, trusting to fate and favorable winds to guide them to land. Gliding along at the rate of a mile an hour, and towing the "Teddy" behind, the huge berg moved to the south. Days of dead calm, storms and occasional encounters with polar bears followed, with doubt and anxiety constant companions. In the midst of a hurricane, the iceberg split, cracking the deckhouse in the middle. Back to the "Teddy" scrambled the crew. When the ship broke loose, the men determined to make a final dash for land over the ice floes. Sledges were rigged. The first day, the travelers made only half a mile. Remaining stores were taken from the "Teddy" and two days later the ship sank. After drifting on the ice pack and facing the danger of being swept out to open seas, the adventurers finally landed at Angmagsalik in Greenland, where they were found by a relief expedition.

Molded Rubber Grip for Golf Clubs Teaches Players Proper Holds

To aid the golfer, a molded-rubber grip that slips on the shaft of any style of club has been invented. By placing the fingers in the proper impressions, the favorite grips of famous players can be duplicated by the novice. Practice with this guide soon teaches the beginner to grasp the plain club correctly and the rubber affords an excellent hold on the club.



Rubber Golf-Club Grip in Place to Guide Fingers to Correct Holding Positions

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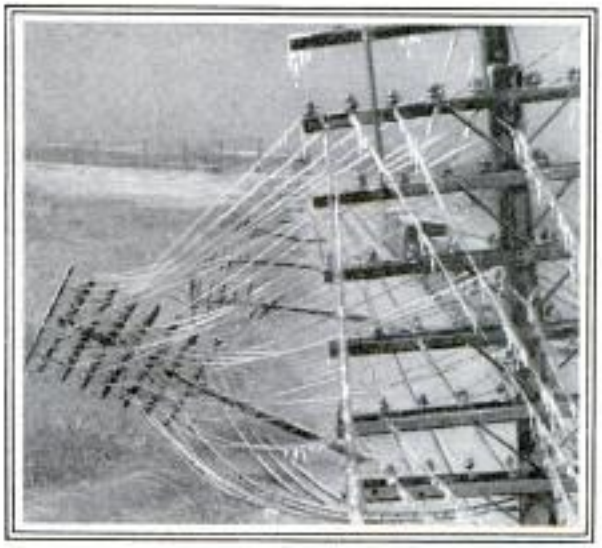
1463 Cont. Earle W. Isage, Ashville. NJ

Locomotive Cautiously Nosing Its Way through a Narrow Snow Canyon Cut by Plows and a Crew of Shovel Men Who Break Trails in the Wake of Winter's Storms

The Battle of the Snows

How Science Is Fighting the Menace of Winter Storms and Reducing the Losses They Caused

BATTLING against the delayed transportation, disturbed business, and the loss of time and money that once were accepted as inevitable consequences of winter blizzards, has resulted in tremendous strides in the invention of mechanical devices to combat snow. While weather statistics show just as heavy annual snowfalls as imprisoned our forefathers within doors, railways, roads and streets are now being kept clear in a battle in which tractors and motor trucks are the principal weapons. Experts calculate that the nation's business loss resulting from inadequate snow removal from our highways during a single winter aggregates $500,000,000. A twelve-day blizzard tied up traffic in New York city, with a business loss of $60,000,000. Billions of dollars worth of improved concrete highways buried under snowbanks may deprive millions of people of easy transportation. Motor trucks are being called upon more and more to move the nation's freight, both in cities and across country. Snow, like every other obstacle that has beset the progress of motor transportation, is being effectively removed. Motor trucks equipped with snowplows now are clearing the way for themselves and other vehicles. Re-



Telegraph Line That Crashed under Strain of Tons of Ice and Sleet Frozen to Wires

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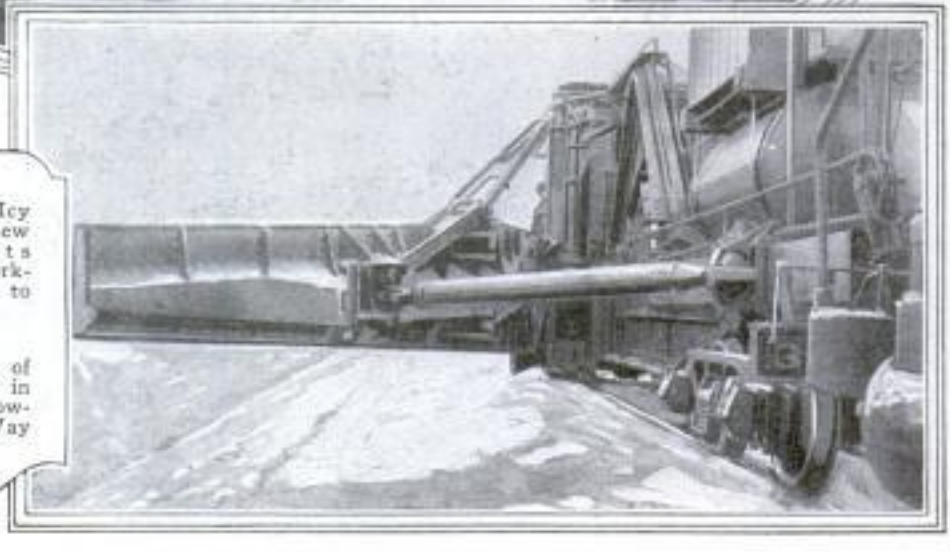
Rescuing a Powerful Plow Jammed by Heavy Snow Barriers

Lake Freighter after Midwinter Voyage



Battling Winter's Icy Grasp on One of New York's Busy Streets Where Gangs of Workmen Feverishly Toil to Open Traffic Lanes

—o—

Right, Giant Guard of Railroad Plow Swung in Place to Divert Snowbanks from Right of Way

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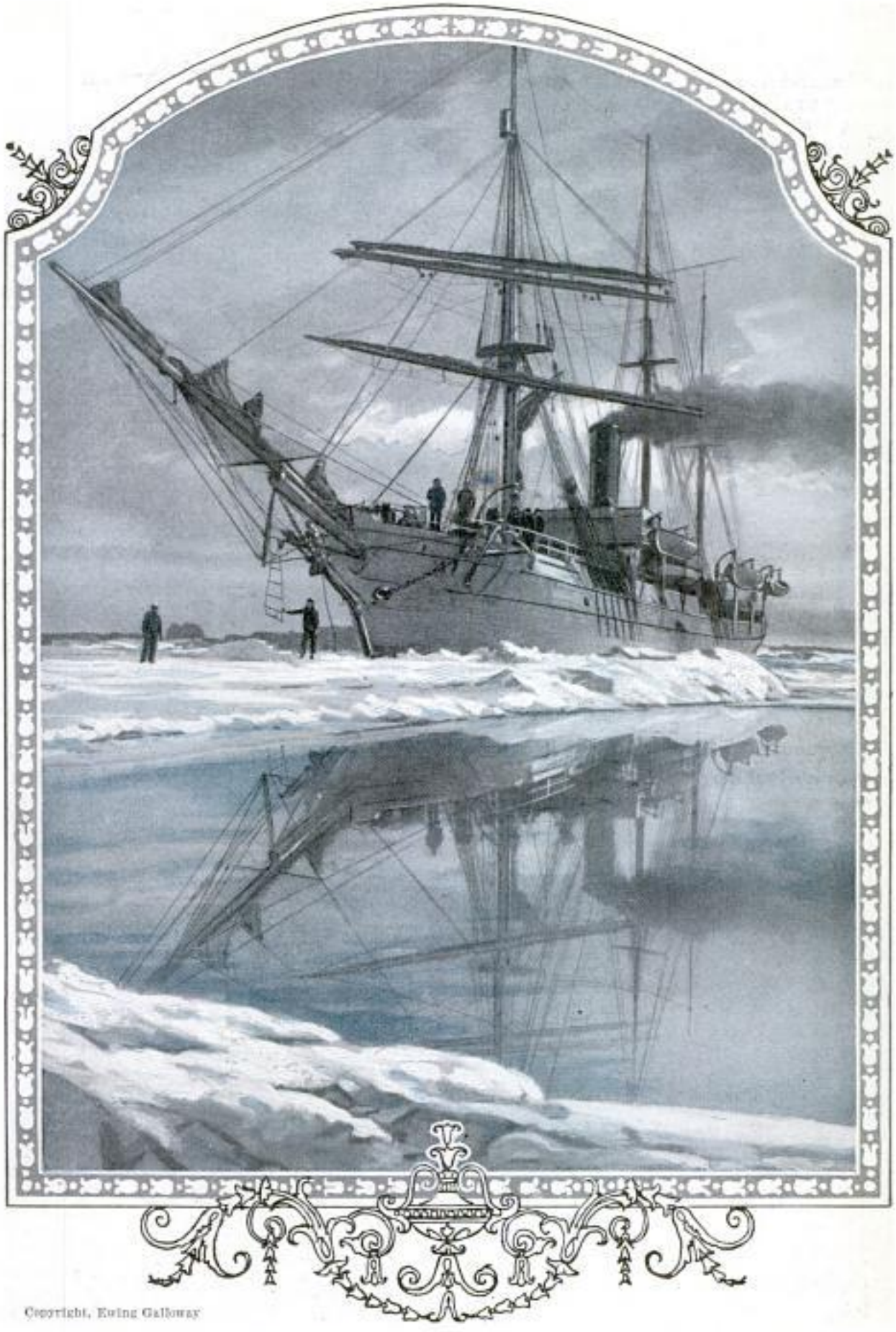

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Tough Going in the Behring Sea; an Ice-Ramming Revenue Cutter Caught on an Icefield off the Alaska Coast, Awaiting Thawing Weather to Weaken Its Support

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moving snow from highways under the old-fashioned shovel method, both slow and expensive, has been superseded by mechanical appliances. Although it costs money to clear a thoroughfare of snow, it costs a great deal more to leave it there. But the cost is prohibitive where man-and-shovel methods are resorted to.

The department of agriculture survey shows 16,000 miles of paved roads to be cleaned this winter in the states east of the Mississippi and north of the southern borders of Kentucky and Virginia. In these states the annual snowfall ranges from twenty inches to 132 inches, and in them is owned sixty-two per cent of the country's more than 15,000,000 motor vehicles.

It is in the cities, however, that the most spectacular battle against snow is waged. One storm in Chicago, according to estimates, cost the merchants $20,000,000 in sales. To prevent such losses, hundreds of thousands of dollars are being spent for snow removal. In New York it costs from $80,000 to $100,000 an inch to get rid of the snowfall above the four-inch depth and keep streets and sidewalks passable for traffic.

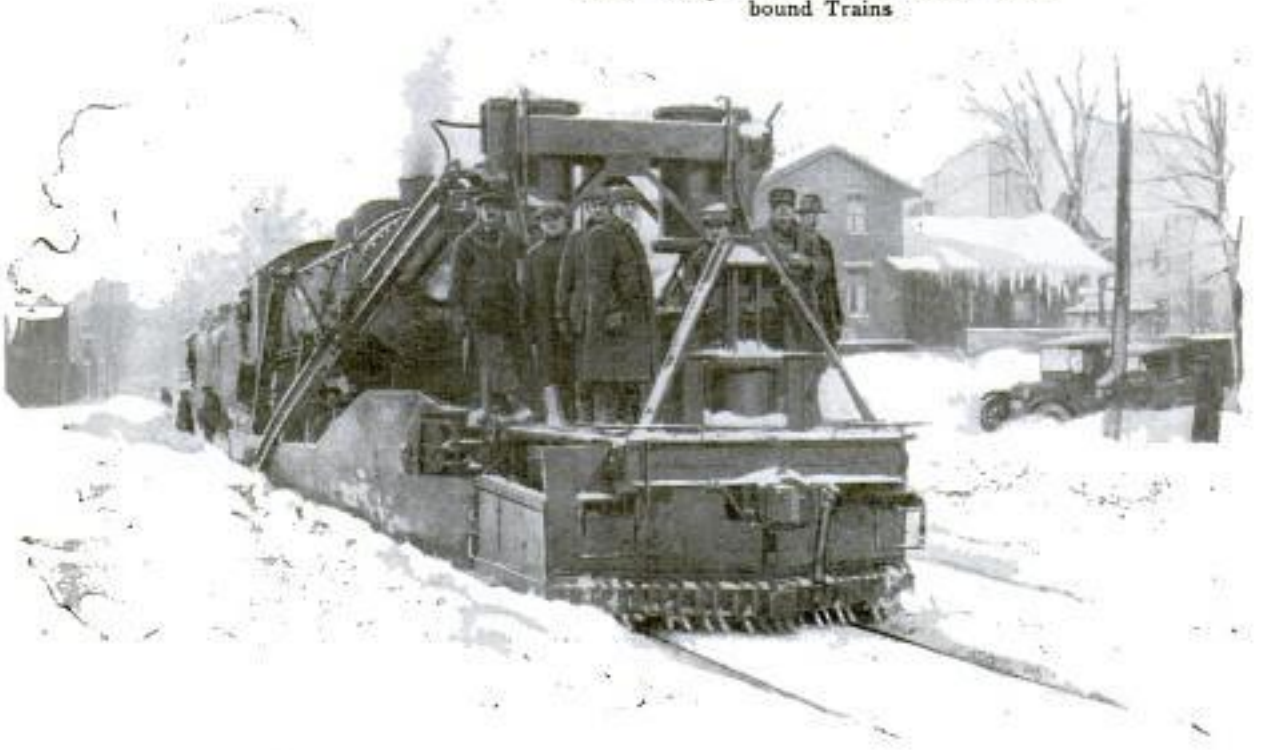
A good part of the half-billion-dollar bill for snow fighting is paid by the railroads. On the prairies of the west hundreds of miles of wooden fence are maintained to break the force of the drifting snow and pile up a barrier to protect the tracks.

A foot or two of snow is enough to almost paralyze eastern cities, but in the western mountains falls of forty to sixty feet a season are not uncommon, and can be removed only by giant rotary snowplows driven by two or more huge locomotives. There is also constant danger in the mountains from snowslides, which have more than once swept down the hillsides and carried away the tracks, or, if a train was passing, engulfed it. The more dangerous slide areas are protected by miles of snowsheds, over which the cascading slides can pass.

The telephone and telegraph companies, too, have a heavy bill from snow and ice. One company alone has spent as much as $7,500,000 in a single year to repair damage from sleet which carried down hundreds of miles of wire and broke thousands of poles. A great sleet storm in New England during the winter of 1921-22 wrecked 10,000 poles, 20,000 crossarms, 42,000,000 feet of bare copper wire, 8,000,000 feet of covered wire and 420,000 glass insulators. The damage to telephone equipment from the single storm was $2,500,000.

In the western mountains, where high-power transmission lines cross the highest ranges, the lineman's task is extremely dangerous. One power company in Montana, operating 4,000 miles of 50,000 and 100,000-volt lines, maintains log refuge cabins every few miles along the top of the continental divide, where the repair crews can take shelter during storms. Frequently the repair men will be stormbound in some lonely cabin for two or three weeks at a time.

Awaiting Call for Help; Railroad Storm Crew Ready for Dash to Rescue Snowbound Trains



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1919. Women's Activities Show Hotel Commodore New York 9/22/24

Two Ways in Which the Supply of Hair, Made Abundant Because of the Bobbing Fashion, Is Being Used: Fixing Elaborate Coiffure on Ornamental Doll and Stuffing Fancy Pillow with Tresses Once Worn in a Style of the Past

Hair from Bobbing Decorates Dolls and Makes Stuffing for Pillows

Dolls with real hair were once considered costly novelties, but since the bobbing fashion has come into vogue, the supply of natural tresses is said to be so plentiful that dolls are given heavy and elaborate coiffures at comparatively little expense. Hair is also being used satisfactorily as stuffing for fancy pillows.

Guard for Safety Razor Prevents Cuts and Permits Faster Shave 1837

Attachable in a few seconds to both old and new styles of a well-known brand of safety razor, a guard has been devised that is claimed to eliminate practically all possibility of the user cutting himself and to give a faster and more comfortable shave. It has a row of teeth on each side and is so shaped that the razor has a triple contact with the skin. Each side of the blade is guarded, its corners are protected and it is held at all times within one one-thousandth of an inch from the face and does not change position. This prolongs the life of the blade, it is said, allows a diagonal stroke and does not scrape the natural oil from the skin nor leave it scratched and raw. Lather pockets help keep the edge clean and the teeth can be set for a light or close shave by loosening or tightening the handle.

As Many Indians in America Now as When Columbus Landed 1983

Indian population of the United States today is believed to be as large as it was when Columbus discovered America, according to reports of the department of the interior. The figures show a total of 346,962, counting all tribes, representing an increase of 2,619 in the fiscal year ended last June and a gain of 16,283 in the last eleven years. Oklahoma leads in Indian population and New York contains the largest number of red men in the east.

W. T. Ensign
Mfr. 127 N. Dearborn, Chicago

New York Times 10/7/24

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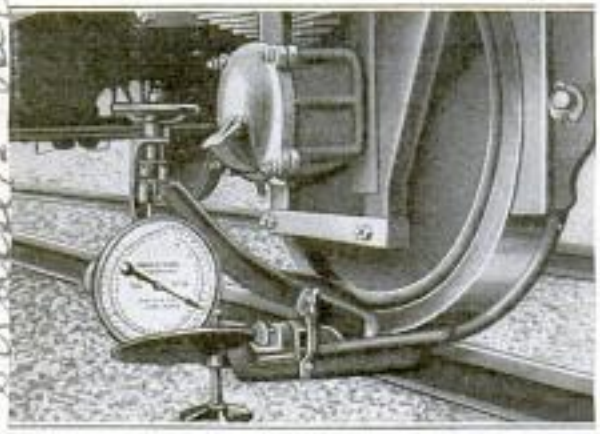
Illustrated London News 9/13/24

Silt and Slime-Covered Hull of German Destroyer in Scapa Flow Held Afloat by Balloon Pontoons Which Raised the Wreck from the Ocean Bottom

Scale under Freight-Car Wheels Gives Weight of Shipment

Eliminating the time and expense required in hauling freight cars to a railbridge scale, a portable weighing outfit that can be slipped under the wheels has been devised for checking overweights and shortages. The weight is registered automatically on a sheet of paper on the dial. The total weight is determined quickly by multiplying by four the result shown under one truck. The scale is used also for weighing locomotives and is of special service in making quick estimates to see if there has been loss by theft during the shipment.



Portable Scale for Weighing Freight Cars Fitted under One of the Wheels

Balloons for Raising Sunken Ships Are Inflated under Sea

Submerged and anchored by divers to the hulls of destroyers of the sunken German fleet at Scapa Flow, balloonlike air pontoons used to aid in raising some of the wrecked craft are inflated after they have been lowered under water. When workmen have closed the openings in the hulks, water is forced from them by powerful pumps. The collapsed bags are then sent down to be attached and filled through air lines from above. Cables run from floating docks are also fastened to the wrecks and, as the balloons begin to pull against their burdens, the hawsers are reeled in by lifting sheaves. Once on the surface, the floated ships are held between concrete barges and towed in toward shore for safety.

Man-Made Spiders That Spin Cable Speed Work on Giant Bridge

Man-made spiders are used to weave more than 25,000 miles of steel wire, weighing 7,100 tons, into the two cables of the Delaware river bridge that will link Philadelphia to Camden, N. J. Each cable is 3,550 feet long, and has sixty-one separate strands with a total of 18,666 individual wires, smaller in diameter than a lead pencil but strong enough to lift forty-

Public Ledger 9/28/24

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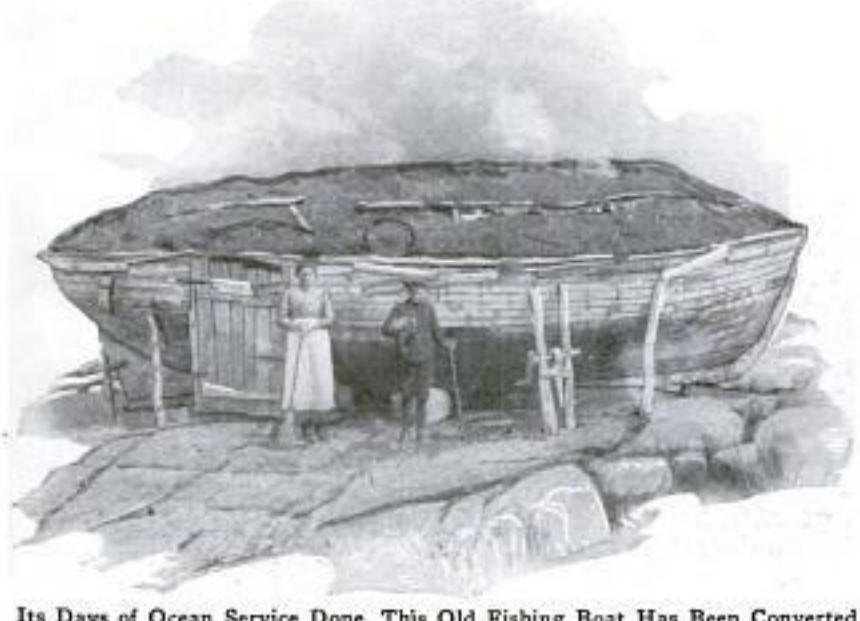
five men of average weight at once. The spiders are grooved hauling wheels attached to an endless steel rope used to pull the wires, one at a time, across the river, over the high supporting towers between the concrete anchorages. The pulling rope passes around a motor-driven wheel or drum on the Philadelphia side, where the wire is unwound, and along the scaffold hung from temporary cables for the workers. A single wire is first taken across and adjusted to hang just as the finished cable will swing. With this as a guide, successive wires are pulled over, spliced and made into a strand of continuous wire with loops at each end. These are carefully anchored and the strand is attached to a chain of heavy steel bars imbedded deep in the concrete. The steel for the wires is said to be four times stronger than that used in ordinary construction.

Old Fishing Boat Roofed with Sod Furnishes Home for Family

Occupying a rocky ledge close to the shore at Indian Harbor, Labrador, the first landing place on this continent of the round-the-world flyers on their return trip, is an old fishing boat, cast up by the tide and now converted into a picturesque home for a fisherman's family. The top has been protected from the weather by a sod roof constructed on poles and crosspieces, and wooden props and rocks along the sides keep the boat upright. Entrance is gained through a door cut in the hull.



Its Days of Ocean Service Done, This Old Fishing Boat Has Been Converted into a Cosy Home

Films So Thin That Ten Million May Be Packed in Inch

Intended for use with X-ray apparatus, films so thin that ten million of them can be packed into a space an inch thick, have been produced by the bureau of standards. The delicate material is made to prevent the passage of minute objects under study without interfering with the light from the machine. Compared to a germ one fifty-thousandth of an inch in size, one of the films appears in about the same proportion as a piece of cardboard is to a full-grown man.

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Lifting Films One Ten-Millionth of an Inch Thick from Chemical Solution with Glass Plates

Gas Replaces Ice for Keeping Fish

The use of carbon-dioxide gas refrigeration instead of ice in shipping a consignment of 15,000 pounds of fresh fish from Halifax to Montreal, was so successful that, when the cargo was unpacked ten days later, the fish was found to be free from odor and the natural color unchanged. The gas is carried in cylinders in refrigerator cars, and the system is expected to extend the market for fresh fish.

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Motor Ills Are Quickly Revealed by "Listening-In" Device

As an aid to motorists and mechanics seeking defects in the operation of automobile engines, a detector with which

Listening to Movements of a Wrist Watch with a Knock Finder That "Listens In" on Auto Engines

knocks and similar noises can be located, transmits the sounds to a telephone receiver. Placed against parts of the machine, a jointed rod carries the vibrations to the earpiece where they can be easily distinguished by the listener. Noises caused by improper working of gears, magnetos, valves and other important sections of the engines are said to be quickly detected through the finder, which is so delicately adjusted as to be affected by sounds that might escape the unaided ear.

Worn Gun Barrels to Be Reclaimed by Plating Them with Nickel

By plating the bores with nickel or other suitable metal, and then rerifling them, the bureau of standards hopes to reclaim worn-out machine-gun barrels. Although the process was tried some time ago without success, late progress in the science of electroplating is expected to be of great aid in the new attempt. When the rifling bands, due to continued fire and the action of the gases of the powder, have become worn down to a certain point, the guns are found to be inaccurate and unfit for further service although their mechanism may be in perfect order. The object of the plating process is to rebuild the rifling with a hard and dense deposit of new metal and thus save the loss caused by throwing away the entire gun. Besides nickel, cobalt, iron and chromium have been suggested for the work. In previous experiments, a platinum wire was centered in the bore as an anode, and nickel was furnished in the form of a fresh solution that was circulated through the barrel.

Telephone Army Three Times as Big as That of Uncle Sam

Approximately three times as many persons are employed in the telephone industry in the United States as there are enlisted men in Uncle Sam's entire standing army, according to reports of the Illinois committee on public-utility information. Telephone operators alone number more than all the officers and men in the navy. Some 350,000 persons are directly engaged in the business, not counting the thousands required to manufacture equipment and supplies.

Electric Razor Cuts Away Beard with Short, Swift Strokes

Causing the edge of the razor to move rapidly back and forth and cut the beard with very short, swift strokes as it vibrates, an electrical shaving device has been patented. Either the straight-edge or safety blade can be used and, when the shave is completed, a vibrator can be put in its place for

Electrical Shaving Machine for Use with Either Straight or Safety Blades

massaging the face. The razor is clamped into a socket and can be adapted for either right or left-handed persons.

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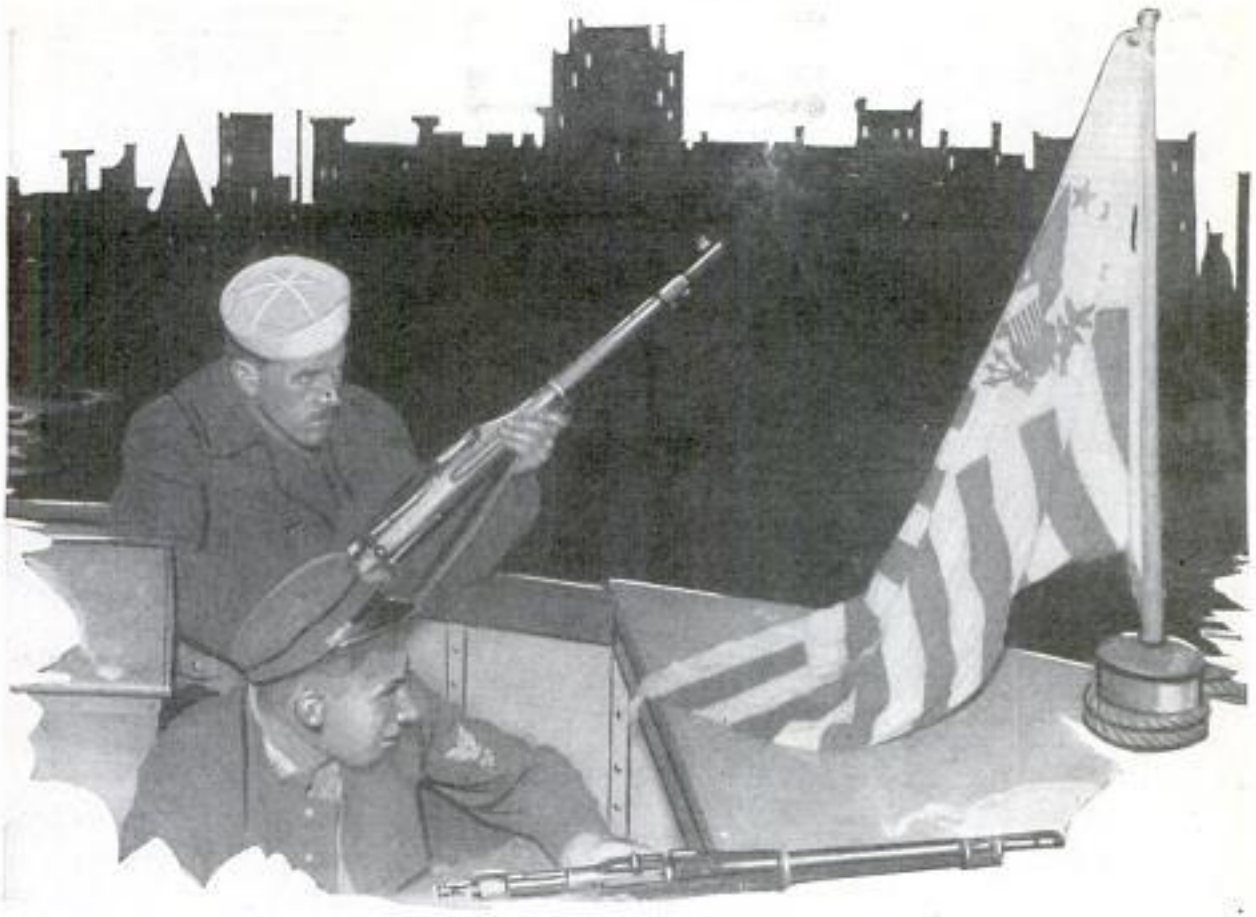
1021 Keystone View Co. 91-7th Ave. New York



Crouched in the Bow of a Speed Boat, the Coast-Guard Patrol Moves Swiftly through the Silent Lanes of Harbors and Waterways Alert for Evasive Rum Runners

Guarding Uncle Sam's Borders

Thousands of Miles of Sea and Land Frontier Ceaselessly Patrolled to Keep Out Prohibited Articles and Collect Duties

A BATTLE of wits that extends around the world is ceaselessly fought by the forces of Uncle Sam and the smugglers' army. Thousands of men, keen of brain and firm of purpose, are enlisted on both sides, spending vast sums of money, and operating entire navies on the seas, and airplanes and motor fleets on land.

Three government services—the customs, coast guard and prohibition bureau—are directly involved in the battle to keep out contraband articles and collect the frontier tolls on others. Assisting them are the department of justice, with its own world-wide system of secret agents, and the post office department, whose inspectors exercise constant vigilance to keep the mails closed to the smuggler. Just how much revenue is lost annually by the government through the activities of smugglers, or the total value of forbidden merchandise brought into the country, is not known and cannot even be guessed, but the government itself admits the total is quite large.

With Uncle Sam's new rum-chasing navy now in action the government forces expect a decided drop in the list of successful smugglers. The government was handicapped for a time by lack of high-speed craft and men to man them, but this deficiency has now been met.

Until the passage of the Harrison anti-narcotic law, jewels led the list of smuggled articles passing American borders, both because their smallness made concealment easy, and because the high duties on jewels offered an opportunity for big profits—if successful. Jewel smuggling, however, like any smuggling designed merely to evade duties, was confined to a comparatively small professional class, with now and then an occasional traveler who attempted to bring in something for

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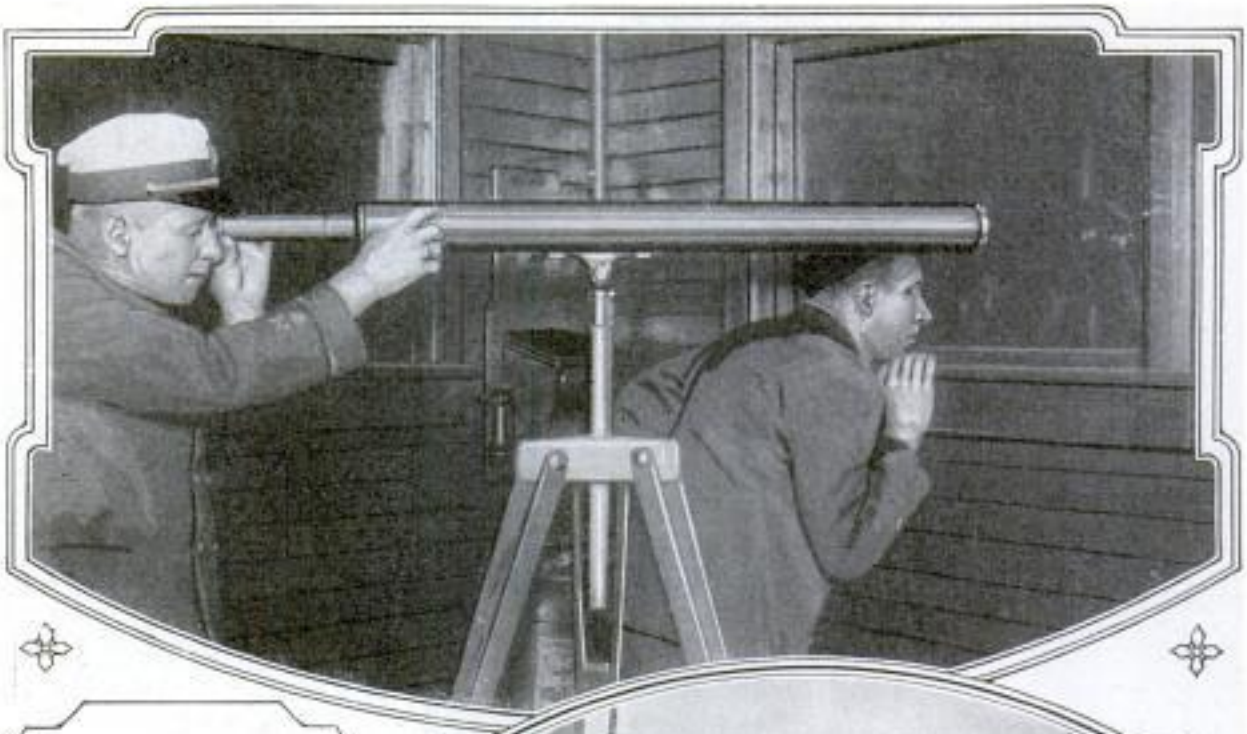

Coast-Guard Watch in a Lightbouse Tower Scanning Long Stretch of Shore Waters in Search of Outlaw Craft That Ply Illegal Trade between Isolated Inlets and Contraband Vessels Anchored Outside of Forbidden Zones

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Right, Sea Sleuth Examining Ship's Papers of an Innocent-Looking Fishing Smack Suspected of Aiding in Landing of Rum Cargoes under Guise of Its Trade

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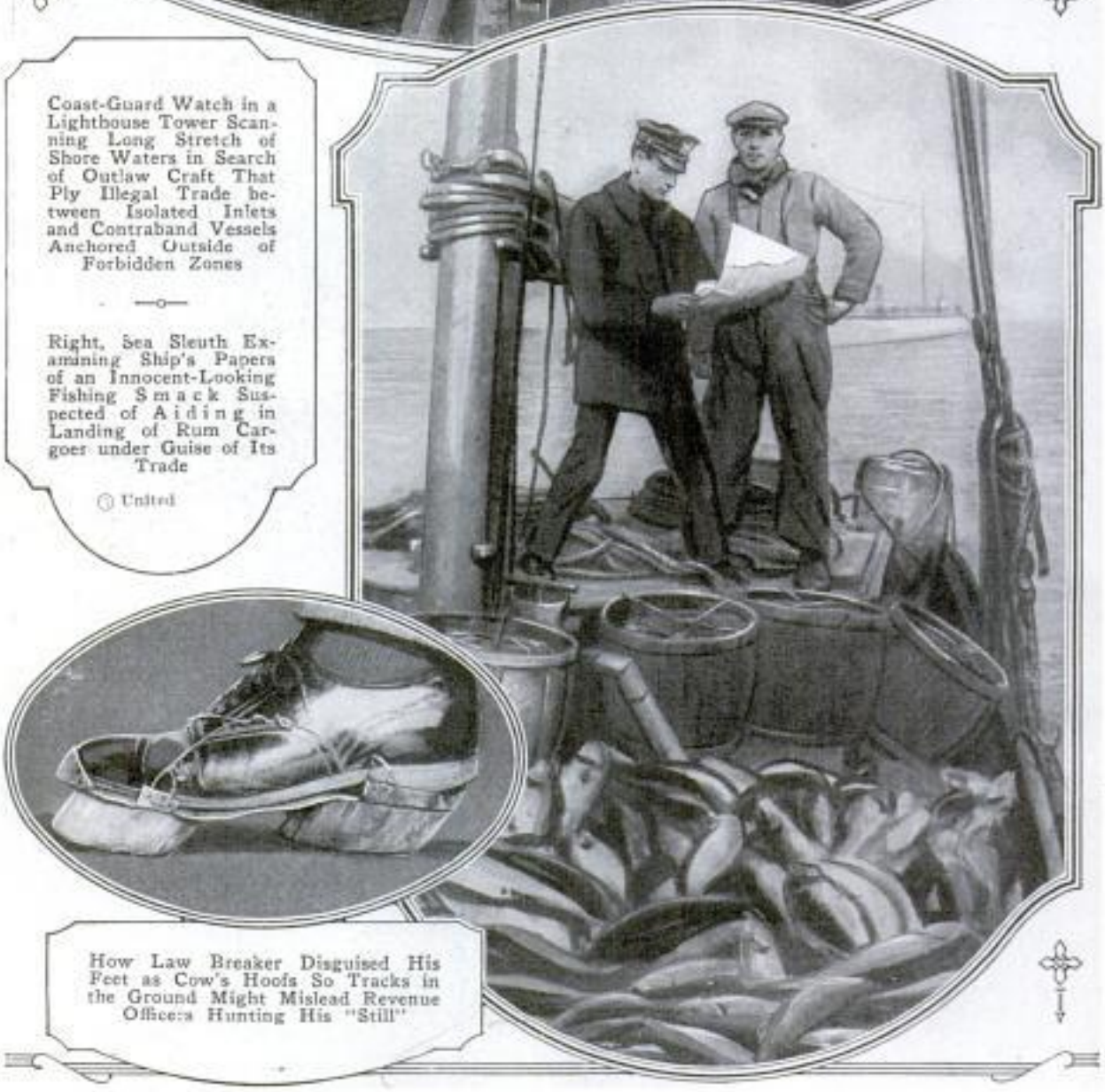

How Law Breaker Disguised His Feet as Cow's Hoofs So Tracks in the Ground Might Mislead Revenue Officers Hunting His "Still"

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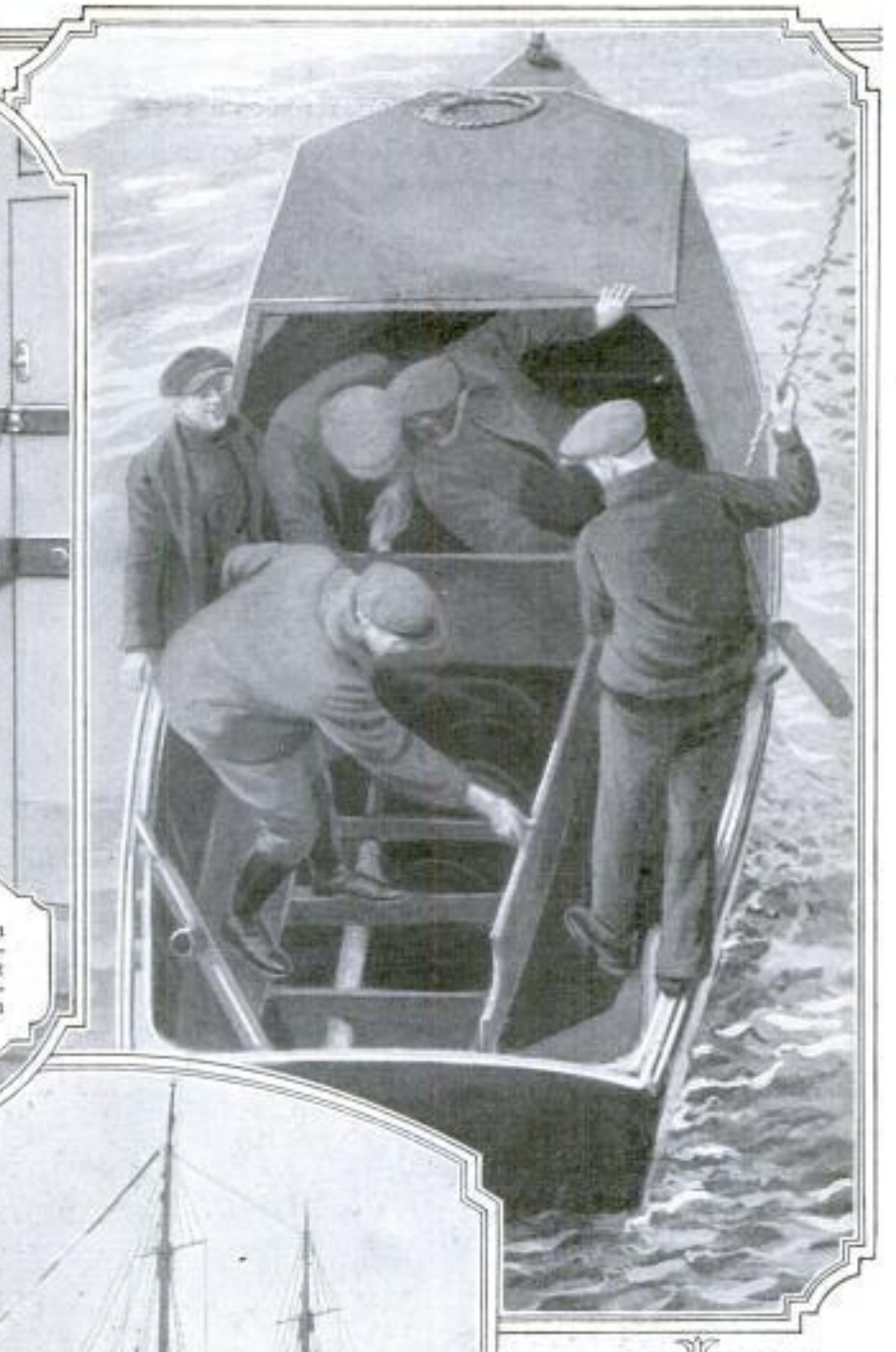
Captain of Foreign Ship Sealing Up Liquor Stores as Boat Nears Limits Provided by Prohibition Laws



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Officer of a Coast-Guard Cutter, on a Hunt for Smuggled Rum and Drugs, Ransacking a Fleet Power Boat of a Type Widely Employed to Balk the Aims of This Country's Narcotic Laws

—o—

Left, Schooner of Foreign Registry Held Up for Examination by Launch of the Revenue Service

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his own use. When the Harrison law put an absolute ban on the importation of narcotics except for medicinal use, it opened a new field that put smuggling on its modern, highly organized and desperate basis. The drug smugglers were often addicts, ready to go to any lengths to bring in the "dope" they craved. About the same time the Asiatic exclusion act started the alien-smuggling business on an organized scale, through the willingness of Chinese and Hindus to pay as high as $200 to $500 each to get into the United States. The so-called "gentlemen's agreement" with Japan opened up a field for the occasional smuggling of Japanese coolies—a field that has been greatly enlarged since the passage of the recent exclusion act. It remained, however, for the prohibition law to put smuggling on a plane where thousands of men are employed in trying to outwit the government, and more thousands to enforce the law. Everything from ocean-going steamships to rowboats and from fleets of fast automobiles to airplanes was impressed into service. The new order came so suddenly that there was no international law to cover it, and until new treaties were negotiated, the government faced a losing fight at times.

Careful Watch Is Kept on Isolated Shores at Night by Beach Patrols on Lookout for Smugglers Attempting to Land under Cover of Darkness

Until an agreement was reached with Canada by which the sister country has taken steps to block violations of our law, it was not unusual for the skipper of a small rowboat to load a few cases at a Canadian river port, take out clearance papers for Cuba or some other foreign land, and then row across to the American side with his cargo. All that has been stopped by the new international agreement. Under the age-old international law, the rum ships in the Atlantic and Pacific could anchor but three miles from shore and in plain sight of the coast sell their cargoes to motorboats and rowboats from land. With a fast motorboat, even in broad daylight, an enterprising smuggler from Long Island and the New Jersey villages could go out and take on a cargo and then race the revenue cutters to shore and unload before the slower government boats could catch up. But the government proceeded to negotiate new treaties extending American jurisdiction against smugglers to an hour's sailing, or about fifteen miles to sea, enormously increasing the difficulties of the small boats of the smugglers, while the new rum-chasing navy of high-speed boats, armed with one-pound rapid-fire guns, can overhaul them in the fifteen-mile chase, or, if the enemy seems disposed to show his heels, a shot or two is enough to make the most daring come to a halt.

The sea-going defense forces are backed on land by prohibition forces and the customs agents, who not only patrol the landing places along the coast but guard the thousands of miles of Canadian and Mexican frontiers. Fantastic tales have been circulated of devices to circumvent the

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Rum Runners' "Graveyard" Where Captured Vessels of All Types Are Tied Up under Guard of Customs Police; and Rag Doll Used in Vain Effort to Conceal Smuggled Laces of Great Value

Shrewdness of a Customs Inspector Disclosed This Consignment of Pearls Hidden in Cigaret Cartons to Deceive Revenue Guards and Evade Import Payment. Government Agents Examining an Incoming Ship's Bake Shop Found the Bread at the Right Fresh from the Oven with Its Burden of Illicit Booze

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prohibition forces. Nearly every seaport has its story, usually vague, of a rum-running submarine, while along the Detroit river boatmen tell weird, and probably untrue, tales of liquor being shot across from Canada in torpedoes, or pumped over through a submarine pipe. The fact that motorboats have been used so extensively to ferry the wet cargoes over from the Canadian shore would indicate that both tales are false.

While liquor, foreigners and drugs continue to hold the center of the stage, both because of the spectacular nature of the smuggling operations and the great profits the smugglers are rumored to have made, Uncle Sam's border guards are on the lookout for many other things.

Every ship that clears from a foreign port, and every mail bag from overseas is a potential carrier of contraband. Deep in the hold of the incoming ship a bale of rags, invoiced as paper stock, may conceal a score of narcotics, liquor, jewelry, forbidden bird plumes, obscene books, or any one of a hundred other articles, either forbidden or heavily taxed. A packing case of china may open as Scotch whisky; boxes of gloves may reveal rare jewels.

Much ingenuity and a wide knowledge of the workings of the customs laws and service are displayed by the professional smugglers. Ten per cent of each shipment of freight is sent to the appraisers' stores for examination, and, as the boxes or packages are chosen at random, there apparently is not much chance for the smuggler to escape detection. One narcotic smuggler, however, shipped a large number of bales of merchandise bearing a low rate of duty, with a supply of drugs concealed in each. Posing as an importer, and armed with a certified invoice and bill of lading, he visited a customhouse broker, gave the name of a client, and asked the broker to enter the goods for him. He paid the duty and charges, and the broker cleared the goods and surrendered the bales to the smuggler. As only ten per cent of the shipment was retained the man got ninety per cent of his drugs, and by the time the appraiser's examination disclosed the drugs in the packages retained, the smuggler and his narcotics had disappeared. A pearl smuggler bought his supplies at an island off the Central American coast, took ship for New York, via Porto Rico, where a confederate received the gems. As the confederate had boarded the ship at an American port and had not been outside American territory he was not subject to examination at New York, while the smuggler was able to pass with a clean bill, despite the most careful search of his person and luggage.

The customs service now has agents scattered all over the world. They keep watch in Paris, London and other foreign cities for professional smugglers, or for large purchases of rare gems by rich travelers, and cable the information to New York. If a traveler who has purchased a pearl necklace or some diamonds in Paris fails to declare the jewels on landing in the United States, trouble is ahead.

During 1923 the customs service made 643 arrests and obtained 351 convictions, with 182 cases still pending.

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Border Police, Trained to Suspect the Most Ordinary Parcels, Are Giving a Supply of Potatoes the Third Degree in Their Drive against Smuggling across an International Bridge

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Students at School for Deaf, Practicing Telegraphy with Ordinary Transmitter Key, and Special Receiver and Headphone That Send Vibrations against Sensitive Nerve in Front of the Ear

Deaf Persons Taught to Telegraph through Keen Sense of Touch

With an improved telegraph instrument devised by the bureau of mines, deaf persons are said to be able to receive and send messages in the Morse code with the same ease as commercial operators who depend upon sound. This is made possible by utilizing the keen sense of touch in the finger tips and in the nerves over the bone just in front of the ear. The apparatus is of standard design with modifications in the sounder or receiving unit and is made in two types, one for finger-tip use and the other for a headphone like that used in radio. When the former is employed, the fingers are placed lightly on a vibrator which registers the dots and dashes as alternating current passes through the windings of an electromagnet. The second instrument is more convenient, as it leaves both hands free for the typewriter. The vibrator in this style is mounted on a light headband and placed over the temporal bone where the sensitive nerves catch the impulses. Experiments with these instruments have been successful, it is said, and suggest a new avenue of employment for miners who have been made deaf by explosions and are thus unfitted for further service underground.

Irrigated lands occupy less than two per cent of the total area of arid and semi-arid sections in this country.

Door Locks Set without Mortising Save Time and Expense

Locks and latches in separate units, that can be fitted to the doors quickly and without mortising or gouging, have been placed on the market. The lock is of tubular construction and may be set above the latch at a convenient height for inserting the key. It is claimed that an ordinary mechanic can install several locks an hour. Only four holes need to be bored

Tubular Lock and Latch with Parts, and as Installed in Handy Position in Door

to set the fixtures, and a bit guide that clamps on the door has been devised to simplify the task. The lock is taken apart easily, both fittings are neat in appearance and are operated by compression springs, which can be replaced with little trouble if they become weakened.

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Highway Service Co. Inc. Army + Navy Journal
1026 W. Van Buren St. 10/11/24

Road Map on Auto Windshield Keeps Route in Sight of Driver

1912 Chicago

Placed against the lower part of an automobile windshield, a narrow road map made to save the motorist's time can be

Auto-Road Map Which Can Be Pasted on Windshield for Convenience of Motorists

referred to without need of the driver relinquishing the wheel. Plainly printed so it may be easily read from the steering seat and pasted securely to the glass, it avoids the necessity of continual reference to bulky pocket guides. The location of the car and the map positions, by being readily compared at identifying points along the way, result in a saving of time lost in checking over sheet guides which often must be opened and held against the wind after stopping the car.

Ruins of Submarine City Are Found Thirty Feet below Surface

2023

Submerged thirty feet below the surface of the Mediterranean sea, off the coast of Tunis, the ruins of an ancient city have been found by divers. They report that many large stone buildings were visible, outlined in the dim shadows and sandy bottom, and that fish swam in and out of crumbled doorways. Scientists are preparing to make further explorations. Additional interest is attached to the discovery as the city lies in waters described by Virgil and near the "Isle of the Lotus Eaters" of which Homer sang.

New York Times 10/16/24

Flares to Help Air-Mail Flyers in Making Night Landings

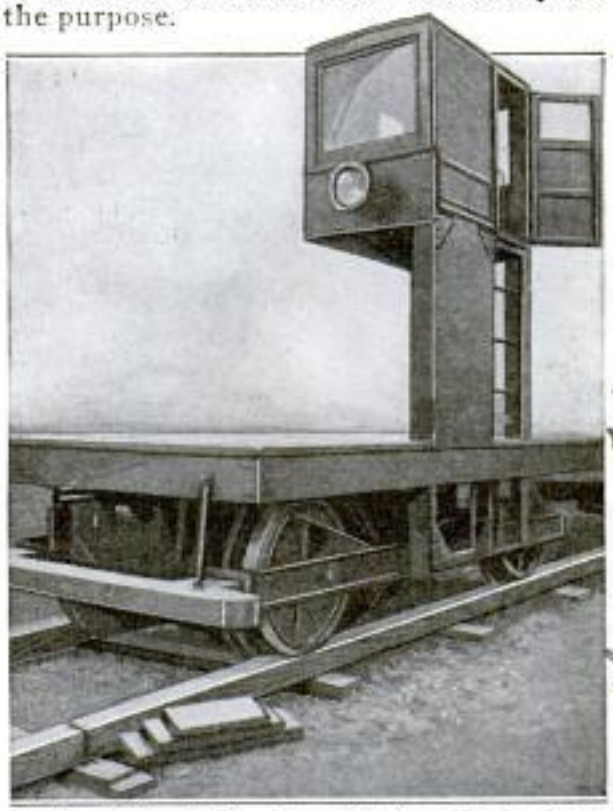
2015

Night flying by the air-mail service is being made safer by a 400,000-candlepower flare fixed to a parachute and attached to the plane. It is released from a position handy to the pilot and the big candle ignites the moment it is set free. As it drifts slowly downward, its light, shed in all directions for about three minutes, enables the flyer to pick the safest spot for landing. Another safeguard is a 100,000-candlepower red ground light that will burn at landing fields to warn the flyers that they are running into bad weather. This signal will be set by radio advices from stations farther along the line. A plan is also being worked out for the adoption of colored light signals for communication purposes at night, similar to those now used by the army air service.

Rubber Tires upon Wooden Rails Save Wear on Locomotives

143

Locomotives and cars that run on wooden rails have been built for an Oregon lumber concern. The wheels have rubber tires with a special flange on the inside, and the rails are planks six inches square. It is claimed that they are easier to handle than steel and far less costly for the purpose.



Wooden Rails and One of the Flat Cars Equipped with Rubber Tires and Special Flanges

no other infor.

Built by Irvine W. Arnold. Oregon.

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1696 The Williams Service 32 Union Square East New York.

"Sounding" Bells of Carillon after Installation; Below, Methodist Temple in Chicago Soon to Have Elaborate Set of Chimes

Carillons of Belgium Come to America

BELL music of the carillon, famed for centuries throughout Belgium and Holland, may soon be heard pealing from many prominent church towers of America's big cities, due to the popularity with which several installations of the great Flemish instruments in this country have been received.

In Morristown, N. J., there has recently been finished the largest carillon on this continent equipped with thirty-five bells, the biggest of the set weighing over two tons. Each of the chimes is in perfect tune with all the others of the series. The instrument is claimed to be capable of closer harmonic arrangements than even the most famous sets of Europe, which are much heavier and larger. The lowest-toned bells of many of the Old World sets weigh between eight and ten tons, requiring structures of tremendous strength to support them. While the bells of

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1696

Frederick Rocke, Noted Player, at Keyboard of Morristown Carillon Shown Above

European carillons are in most cases hundreds of years old, modern foundry methods have succeeded in producing many tuned to the accuracy of a single vibration. Because of these advances it is thought the adoption of the instrument for churches of this country will result in higher development of both arrangement of bells and the art of playing. Unlike the chime or "peal" of bells which generally consist of five to fifteen large gongs and play melodies in single notes, the carillon is made up of from twenty-three to fifty-three bells and can produce a complete score. And since it is played with a complete keyboard, some of the most complicated pieces can be performed on the instrument.

The largest carillon is said to be that of the cathedral of Antwerp where upward of ninety giant bells hang in the lofty tower. The biggest of these was cast in 1507 and was installed in the presence of many notables of that time, among whom was the reigning king who consecrated the bell. Some of the most noted carillons of the United States are those of Gloucester and Andover, Mass., with sets of thirty-one and thirty bells, and twenty-five-bell instruments in Plainfield, N. J., and Birmingham, Ala. In addition to these, many others are under construction, one New York church preparing an installation of fifty-three bells. With the growing use of this ancient form of musical entertainment it is expected expert players will be employed to render regular programs, for owing to the great distances at which the vibrant notes of the bells can be heard, melodies could be listened to by vast numbers of people, especially in thickly populated communities, without traveling far from their doorsteps. Almost all the carillons of European countries are equipped for mechanical operation. Hand-played carillons are employed by famous artists whose concerts are widely attended.

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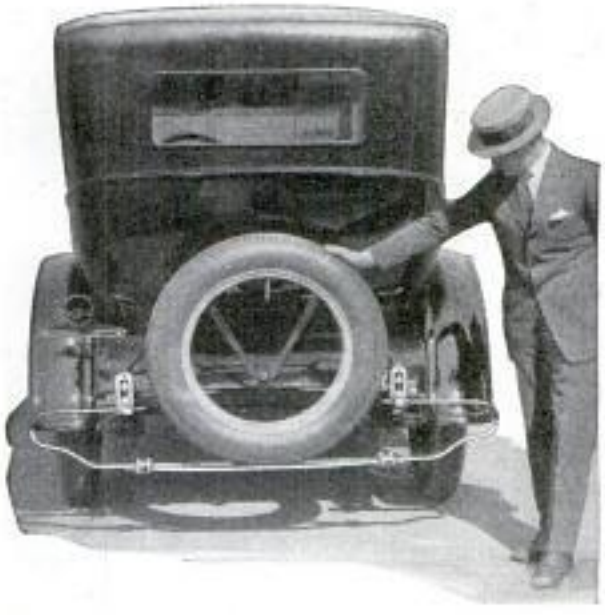
Seeds Given Chemical Stimulants to Increase Yield of Crops

By treating the seeds with chemicals, a Bulgarian scientist claims to have discovered a way to increase yields of tobacco, cotton, cereals and other crops from twenty to fifty per cent. His practice is to immerse the grains in a carefully prepared solution and leave them there for a fixed time, just long enough to give the desired stimulation without injuring the seeds. The mixtures, if taken in large enough quantities, may be poisonous to vegetable and animal life as well, but if administered in the right amounts, appear to quicken the vital functions during the whole development of the stimulated plant. The process is being investigated by experimenters at the department of agriculture.

Hinged Bumper for Rear of Autos Makes Tire Removal Easy

A rear bumper mounted on hinged brackets, so that it may be lowered, out of the way of the spare tire, has been placed on the market recently. A bolt in the upper part of the hinge holds it in place normally, while a few turns on either side release the bumper and allow it to drop down. A lug on the bottom of the bracket automatically stops the bumper at the end of a ninety-degree arc, holding it level as a step on which to rest the spare tire while removing or replacing it on the carrier.



Hinged Auto Bumper, Lowered to Give Ready Access to Spare Tire

The bumper comes in sizes adapted for one or two spare tires, and extends the full width of the car, to protect the fenders.

Odd Hotel Register of Metal Tags Prevents Mistakes in Names

Guests at a hotel in England, instead of signing a register book, put their names on tin tags with an automatic press, and

Guest Adding His Name, Stamped on Metal Tag, to Others on Unusual Hotel Register

tack them to the walls of the office. The metal "autographs," plainly displayed, interest incoming patrons who may recognize the name of some friend, and save the management the embarrassment of mistakes in deciphering handwritten names.

Improved Animal Trap Cannot Be Sprung by Birds

Using a coil spring instead of the flat-spring type common for the last seventy years or more, a new game trap is said to be proof against being sprung by birds, who have often annoyed trappers by tampering with their sets. The trap marks several departures from the conventional design. It uses steel arms to catch the game, and as the trap leaps upward when the pan is sprung, it is claimed it will catch the game higher and insure a better hold. Greater strength and efficiency and lighter weight are said to be other advantages, while the round surfaces of the coil spring are not so exposed to rust as the flat springs. A wingnut is used to compress the spring which may be adjusted to any desired tension.

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Folding Chair in Use, Close-Up of Its Construction, and Putting It into Box

Chair That Folds Up like Umbrella Adds Comfort to Camping

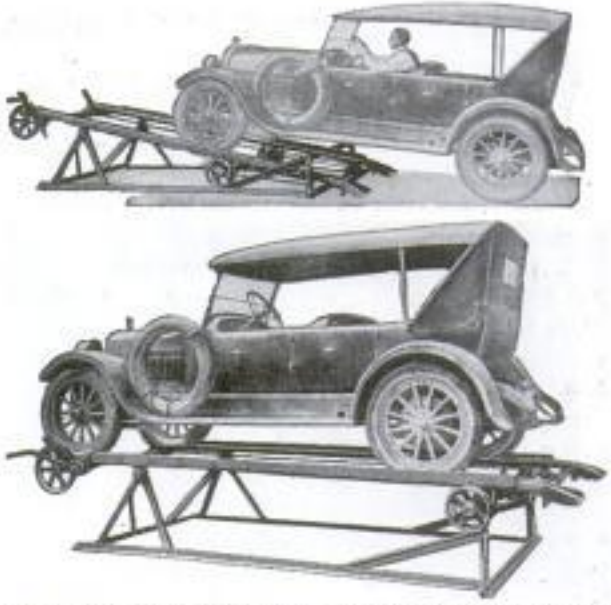
Resembling a short, stout umbrella, a sturdy folding chair has been placed on the market by an English inventor for use in camping and traveling, and for any other purposes where a comfortable, collapsible seat is desired. An air cushion, inflated by blowing into a small valve at the side, forms a soft top for the chair. It is held in position by folding ribs kept open by a locking pin passed through a hole in the sleeve to which they are fastened, and through a hollow central supporting tube. The legs are inserted in a casting at the end of the tube, and as they are of different diameters, they fit within each other and slip inside when the seat is taken down. A neat carrying case is provided for packing the chair which can be set up or folded in a few seconds.

Whole Geography Found in Make-Up of an Electric Motor

In the making of the modern electric motor there must be brought together products from half the countries of the world. Yellow men, brown and black, labor in mines, fields and forests in far places of the earth to provide the materials, while elephants, camels, human shoulders and ocean liners all help in carrying them. Silk for the motor windings begins in the life on the leaf of the Chinese mulberry tree; the rubber under it was drawn from a tree in Ceylon. Gums for the varnish come from the Philippines and the Malay peninsula and the raw umber that colors it was dug in Turkey. Linseed oil for the insulation was obtained from flax grown in Argentina; China, Singapore and Cornwall in Great Britain contribute metals. Shellac for the shell was gathered in India by brown men who climbed tall trees to break off the twigs on which it had been deposited by insects. About ninety more materials are used, including metals from mines on this continent, cotton and steel.

Inclined Track for Mending Autos Saves Space of Garage Pit

For raising automobiles to a convenient position for making repairs or adjustments under the chassis, a strong steel frame with an incline roll track has been manufactured. The car may be run upon the platform by its own power, or if the motor is "dead," it is easily pulled up by means of a winch attached to the foundation. When the auto is in place, a safety chain ties the roller axle to the frame, thus preventing it from dropping or moving until released by the operator. For brake adjustments, particularly those of the four-wheel type, special jacks, which permit two or more wheels to be raised at the same time, are provided, and the frame is also of great service in changing the springs.



Car Mounting Incline Track, and in Position for Mechanics to Work on It

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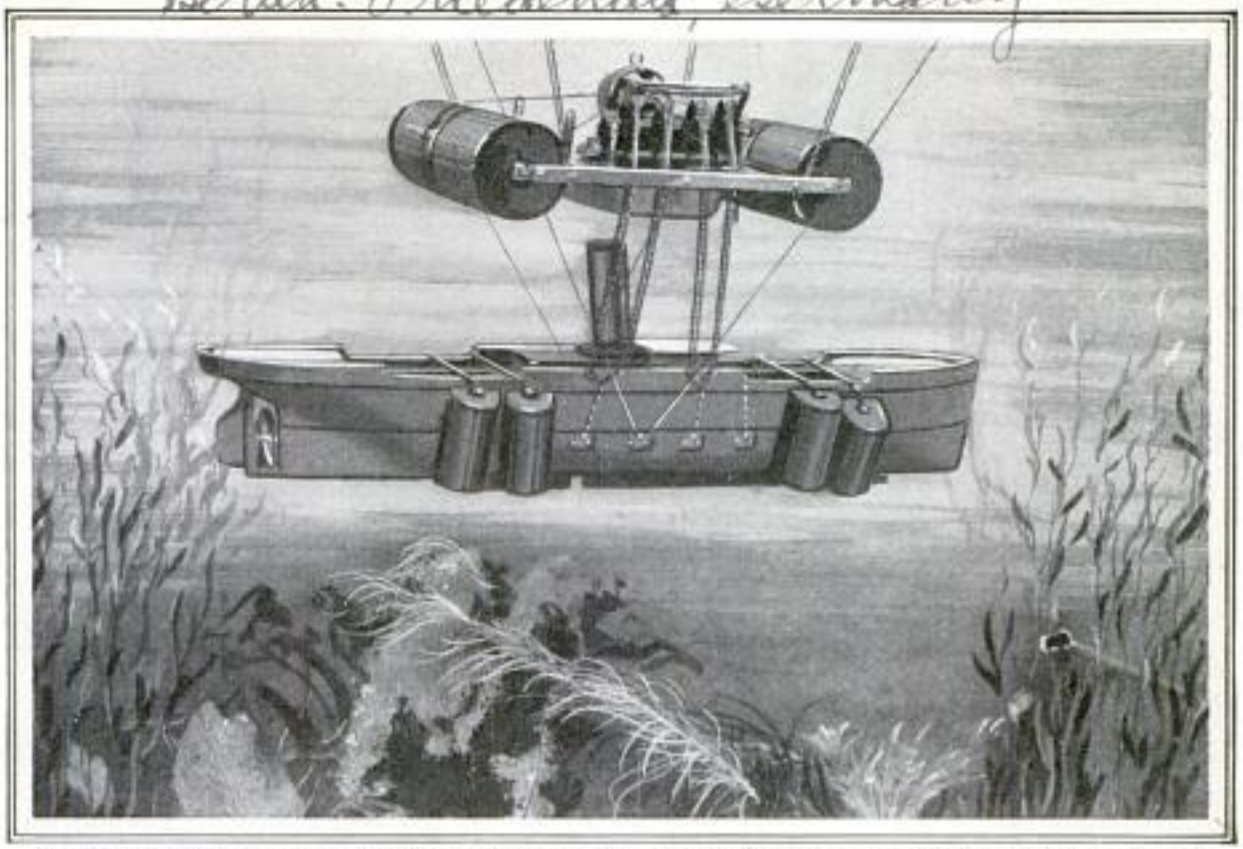
1980 Dr. Alfred Israelowitz
Sesselerstrasse 20
Berlin-Friedenau, Germany



An Early Experiment in Raising Sunken Vessels Designed for Still Water; Rigid Pontoons Are Attached to the Craft for Buoyancy While Lifting Is Accomplished by Winches

Science vs. Davy Jones' Locker

Divers Set Out to Conquer Nature's Last Outpost on the Bottom of the Sea by Reaching Depths Hitherto Never Visited by Man

WITH the upper air conquered and the globe girdled by flyers; with both poles of the earth visited and the deserts spanned by auto busses, man, looking for new worlds to conquer, has turned again to the bottom of the sea.

Spurred on by the sinking of nearly 12,000,000 tons of shipping, valued at $4,000,000,000, during the war, inventive genius has set out to push man's realm to greater depths than have ever been explored before, and to wrest back from Davy Jones some of the millions he has claimed as the toll of the resistless sea.

In England, salvage companies are at work on the greatest task in ship recovery ever launched—the lifting of the entire German fleet sunk at Scapa Flow.

In Germany, a new diving suit has been developed which already has carried a man 219 feet lower than anyone ever went before, and brought him back safely to the surface. And in America an inventor is preparing to test out on the Great Lakes a new salvaging device which embraces a novel method of attaching lifting chains to a sunken hulk.

Buried treasure has always exercised a powerful appeal on the imagination, and when that treasure lies at the bottom of the sea the appeal is doubly strong.

Davy Jones, though, has always been a relentless bandit and guarded his loot well. For every foot the diver sinks beneath the surface the pressure of the enormous weight of water above increases and threatens to crush him. It is that pressure that has fixed the limits of deep-sea diving in the past. Ten years ago when Frank J. Crilley, navy diver, went down 306 feet beneath the waters of Pearl Harbor, Honolulu, to fix chains around the lost submarine "F-4" in order that she might be brought to the surface, her dead recovered and the cause of the disaster learned, he broke all world's records.

But now comes an inventor in Kiel, Germany, who has constructed a diving suit in which he has descended 525 feet beneath the Walchensee, in Bavaria, and

made by Neufeldt + Kuhnke, Kiel, Germany

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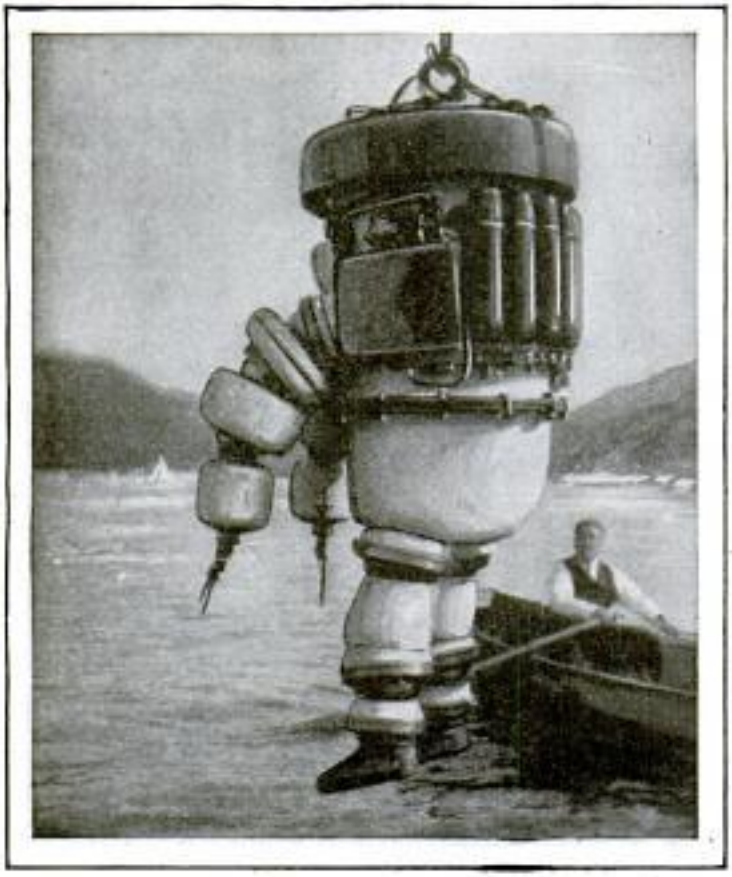
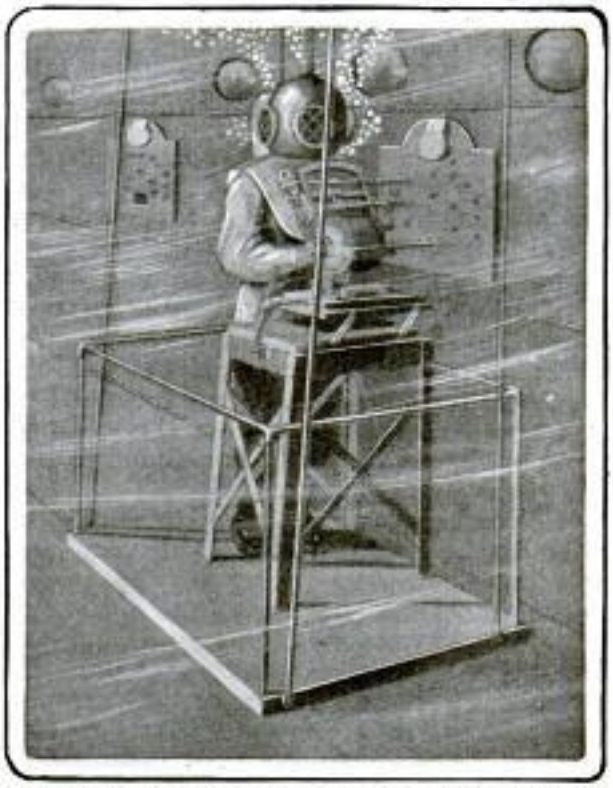


Deep-Sea Diver in Heavy Armored Exploring Suit Being Lowered by a Ship's Crane for a Tour on the Ocean Bottom

walked around on the bottom, unhampered by air line, for he carried his own oxygen supply with him. His only connection with the surface was a light telephone line, by which he talked to his mates on the surface. But more important than the great depth attained, was the speed of his return. Protected from the crushing pressure of the water, he ascended in four and one-half minutes and stepped out of his diving suit uninjured.

The suit itself looks like nothing so much as a small U-boat turret walking about on curious jointed legs and with a pair of arms fitted with metallic fingers. In action, too, it resembles a submarine, for it is equipped with diving tanks by which it sinks or rises as water is admitted or blown out, while the spacious nether garment is even fitted with a seat so that the tired diver may sit down in his own trousers. The trunk portion is made in two sections of which the upper contains signaling devices, telephone, controlling attachments and measuring instruments, and the lower affords space for balance and descending weights and tanks that enable the diver to descend or rise at will by admitting water or blowing it out with compressed air furnished by six cylinders. While the German inventor expects his suit will revolutionize salvage work at great depths, an American inventor has devised an unusual apparatus for lifting ships, and will try it out first on one of the many cargo vessels which have sunk in the Great Lakes.

The unusual feature of his outfit is a steel plate equipped with expanding drills. Attached to the lower end of the lifting chains, the plate is to be lowered alongside the vessel, and then made fast by drilling through the steel hull, when the expanding drills will automatically make it secure. For lifting purposes he proposes to utilize steel pontoons and lighters, fitted with winches, as well as collapsible pontoons, looking like the sausage balloons of war time. They were used with success by the English at Scapa Flow during the last summer to raise the sunken German ships. Lowered fifty feet under water and attached to the lifting chains, the bags are then pumped full of air to help raise the ship. After the vessel swings free, the pontoons and lighters are towed toward shore until the keel grounds again, when the process is repeated as many times as may be required.



Diver Attaching Hangers to the Side of Sunken Ship by Means of Expansion Drills

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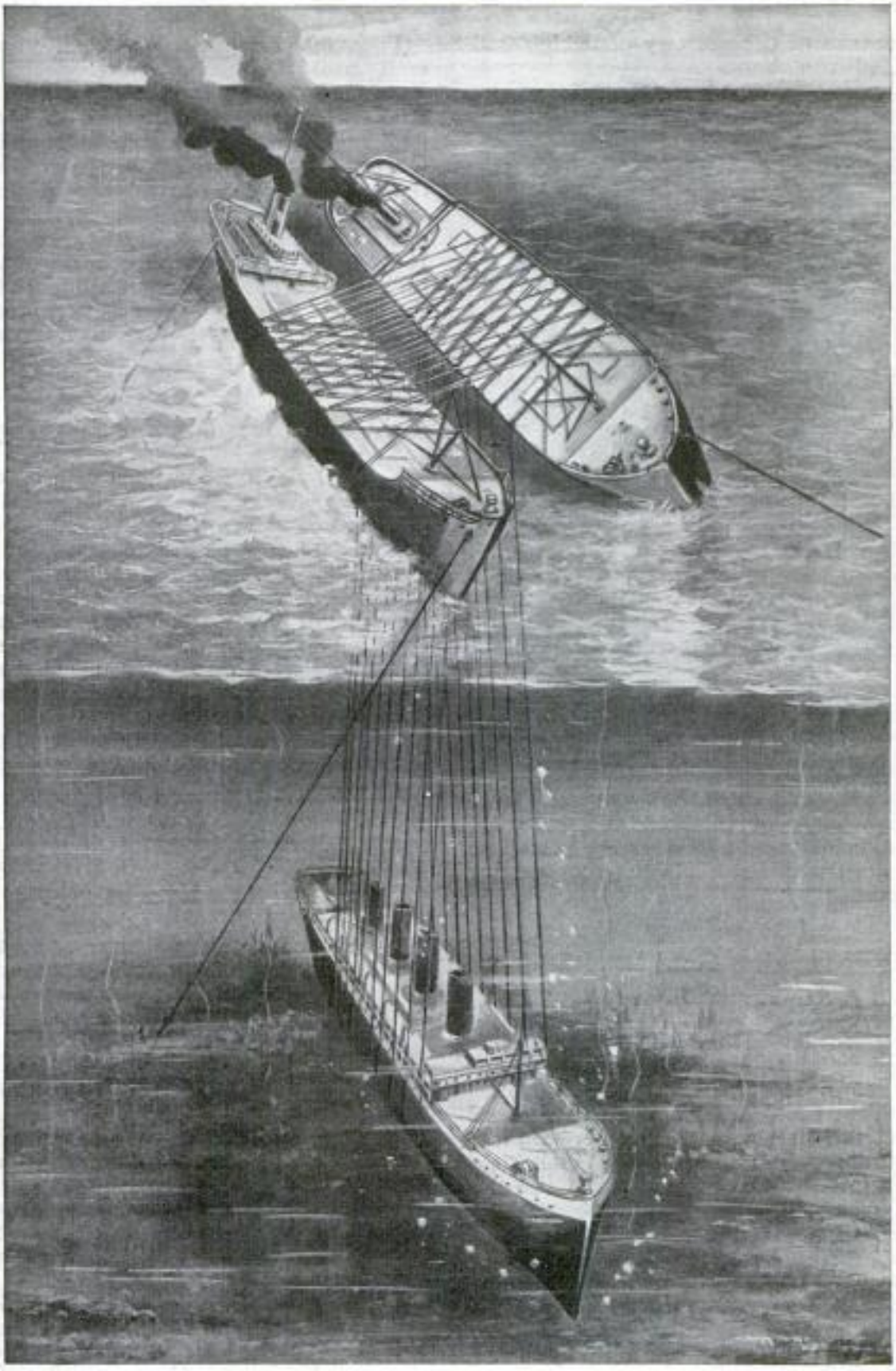

Salvaging Method Whereby Surface Ships Are Lashed Together and "Rolled" by Shifting Their Heavy Ballasts, Which Lifts Wreck in Short Jerks along Sea Bottom to Shallow Water

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Boots of Galvanized Iron for Miners Serve during Rubber Shortage

Because of the scarcity of rubber, galvanized-iron boots are being used by miners in Germany where coal is being

German Miner in Bucketlike Boots of Galvanized Iron, a Substitute for Rubber

dug at the surface. They are made large enough to permit inserting the feet without difficulty, and two rings are placed on the sides to assist the wearer in putting them on.

Cost of Making Gold Leaf Reduced by Electric Process

Modern knowledge of electricity and chemistry promises to reduce greatly the expense of manufacturing gold leaf. For centuries, the process has been to pound the metal with hand mallets between layers of parchment, the cost of the labor exceeding the value of the gold. By the new method, the precious metal is electrically deposited upon a ribbon of thin silver from a chemical solution. With the gold on its upper side, the strip is laid upon a celluloid band and immersed in nitric acid. This eats away the silver, which is later recovered, leaving the gold upon the band. There it is washed in alcohol and then warm air from electric fans blows the gold leaf from the celluloid and slides it between protecting sheets of paper.

Half-Smelted Ores of the Ancients Salvaged by Modern Foundries

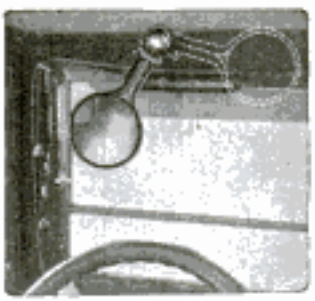
Piles of half-smelted material discovered near Leghorn, Italy, where the Etruscans, 2,000 years ago, brought ore from the island of Elba, are proving a bonanza to modern Italian iron foundries. Only about thirty-five or forty per cent of the metal was extracted by the crude methods of the ancients, but modern furnaces can easily work out the rest of it. It is estimated that there are 11,000,000 tons of the refuse lying in hillocks along the shore. Mixed in the debris, a number of Etruscan vases, tombs and human remains have been found.

Wood Carved by Sandblasting

Natural wood decorations of a hotel in Hoquiam, Wash., were ornamented by designs cut in the surfaces by sandblast. Stencils were employed to trace the figures of flowers, birds and industrial products of that region, and the results present the effect of handwork. The blasted parts were left in their natural colors while the ornaments were tinted in various shades. In the operation more than 600 stencils were used. Walls, ceilings, pillars and fireplaces were treated in different designs and the tinting blended to create a pleasing pattern.

Auto Mirror Also Serves as Shield for Driver's Eyes at Night

The blinding glare from automobile headlights can be kept from a motorist's eyes by a shield which also serves as a rear-view mirror when needed. Instead of hiding the lights the device permits them to be seen plainly, but guards the driver's vision from annoying rays. The shield operates on a joint which permits instant adjustment to any position for use as either a mirror or eye guard. It is also designed for driving against dazzling sunlight and for protection from harmful flashes reflected by wet or light-colored roads. The shape can be attached in a short time to any type of car.



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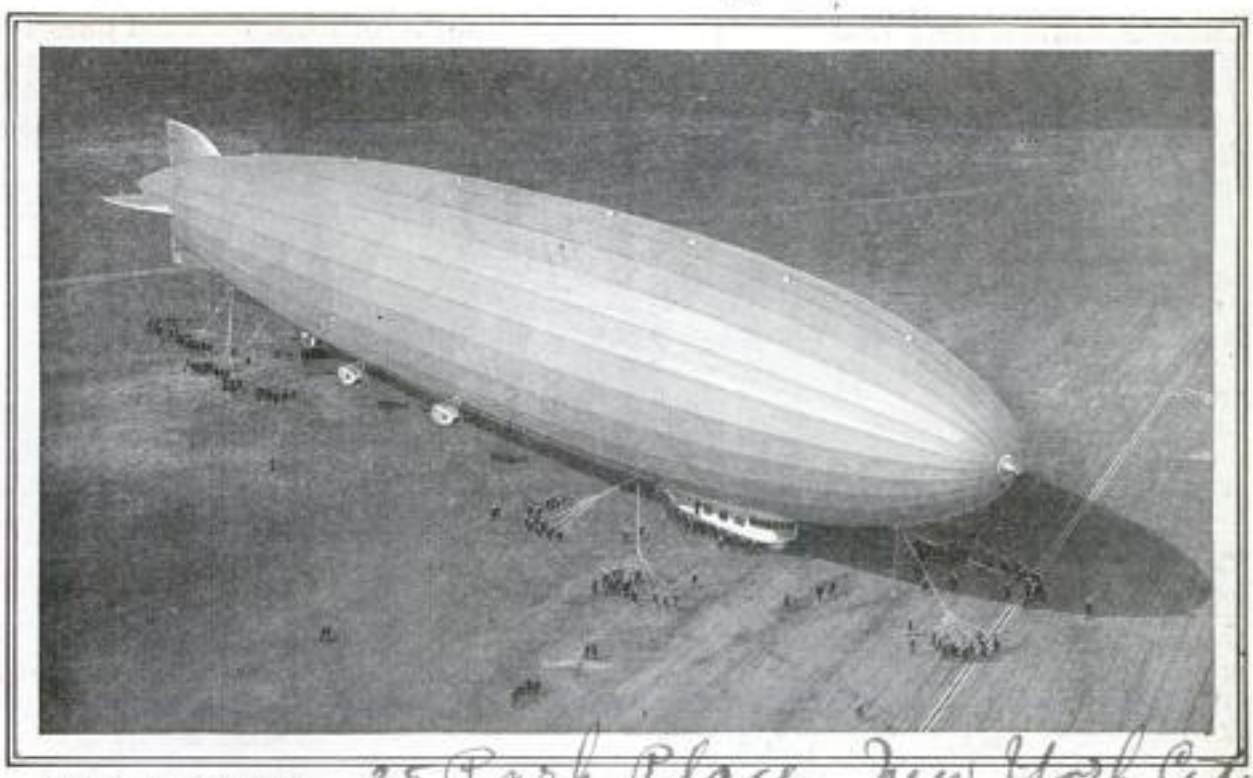

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The "Los Angeles," as Its German Crew Brought It to the Ground at Lakehurst, New Jersey

Across Ocean by Air in Two Days Seen by Zeppelin Builder

Lighter-than-air craft of the type of the "Los Angeles"—formerly the "ZR-3"—can maintain regular service between America and Europe with a running schedule of one-third the time taken by the fastest transatlantic liners, according to Dr. Hugo Eckener, who flew the craft to America for delivery to the navy. Flying more than two-thirds of the 5,060-mile route from Friedrichshafen to Lakehurst at cruising speed, with only four of the five motors operating most of the time, and only three at others, the "Los Angeles" averaged 62.35 miles for the entire distance. Cruising speed was maintained most of the way to conserve gasoline, in case head winds or accident should delay the trip.

On the much shorter trip between America and England, the vessel could easily run at seventy-five miles all the way without endangering its gasoline reserve, while fast liners average twenty-five to twenty-eight miles an hour, making the trip in five to six days. Thus the "Los Angeles" could cut the voyage to two days. That the ship may eventually be used in some such international passenger and mail traffic is indicated by statements from naval officers that the ship will be sold to a private company for commercial operation.

The Cabin of One of the Five Motors Which Drove the Big Ship

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Western Electric News Service
195 Broadway
New York City 9pw

Loud-Speaker Phones on Battleship Sound Orders to Entire Crew

1859

Instead of bellowing their orders down the hatches as was necessary not so long ago, boatswains on Uncle Sam's battleships today simply step to loud-speaker telephones, give the call on their pipes and then speak the command. If they desire, they can send the words simultaneously to every corner of a great ship by hooking the circuits together. The dreadnaught "West Virginia" has a battery of 100 of these instruments and they are so arranged that by using only certain circuits, special orders can be delivered without reaching anyone but those concerned. The system is operated from the bridge, the main deck aft and from the ship-control room during target practice or battle. A two-stage vacuum-tube amplification is employed to insure clear transmission. In addition to the loud speakers, the "West Virginia" makes extensive use of the ordinary telephone. Her switchboard has a capacity of more than 200 lines to serve the 1,400 officers and men, and when the ship is in dock, the system is connected to the shore lines for official business.

Dusty Streets Are Tarred and Oiled to Curb Lung Diseases

2045

When scientists declared that granite dust from paving in Vienna was responsible for an increase in tuberculosis cases, authorities, after an investigation, had the stones covered with tar and oil. The cost, it is believed, will be offset by decreased demands on state charity organizations.

New York Times
10/20/24

"Stand By for Muster!" —Boatswain's Call, Piped into Loud-Speaker Phone, Sounds from Horn in Distant Recreation Room

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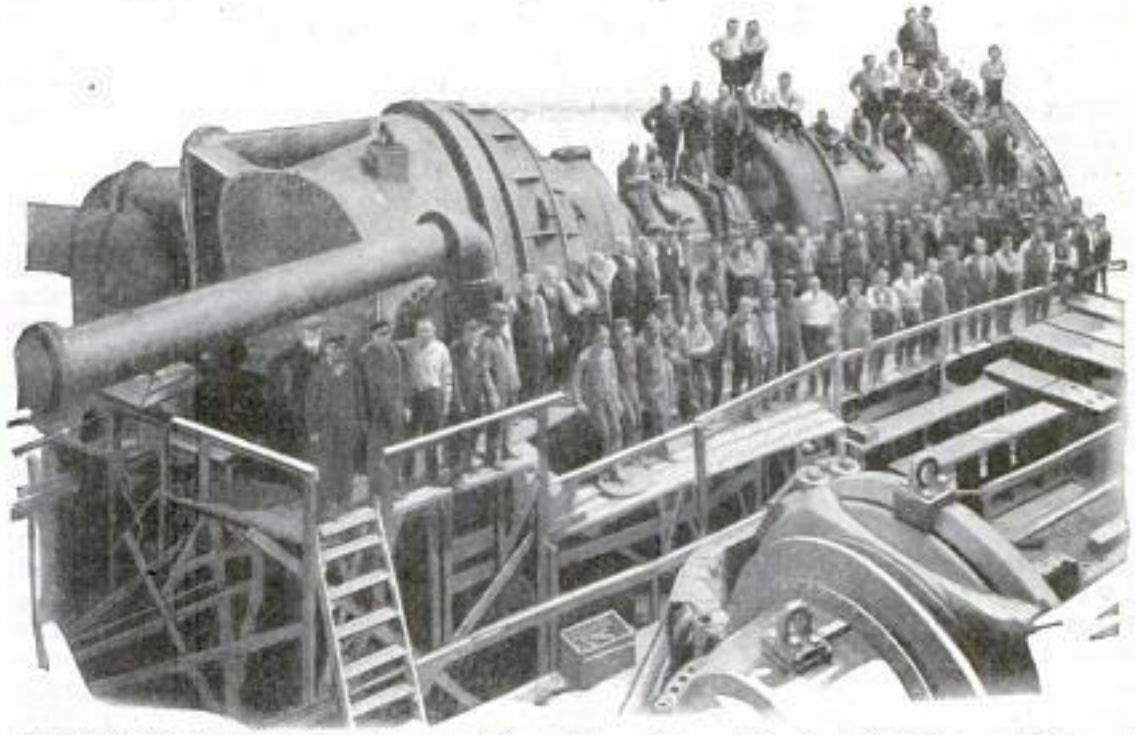
Editorial 1550



Massive Turbines Grouped along Courses of Super-Power Systems Can Send Their Output of Current Hundreds of Miles Distant to Meet Shortages of Energy in Other Stations

Super-Power, the Coming Giant

WHAT is the future of electricity? One of the greatest of public utility builders says: "I would place no bounds on any man's imagination as to what it may eventually do for the human race, but it spells the knell of drudgery."

At an initial cost of a billion and one half dollars for the development of super-power in the northeastern states an annual saving of $500,000,000 in this district is predicted by a committee in its report to Secretary of Commerce Hoover.

The proposed plan means a vast interconnected power system with the establishment of centralized steam-electric plants, the development of all possible hydroelectric resources and the linking together of all to carry the power over transmission lines to cities, towns and farms. This system of electric-power generation and transportation is called super-power.

By the establishment of such a system it would be possible to send the surplus current produced at one plant coursing over the transmission lines to fill the needs of another plant hundreds of miles distant. The developments in the transmission of electric power and the machines which produce it have made this possible. Only thirty years ago the first hydroelectric plant was inaugurated by sending its current fifteen miles over copper wire to light a banquet given for its builder. Since then the same engineer has sent electric power from Bishop Creek to Imperial Valley, California, a distance of five hundred miles.

The obstacle in sending electricity great distances at high voltage is loss of current through leakage in the wire and around the insulators. With proper insulation it will be possible to send electric power from coast to coast.

The advantages claimed for super-power are numerous and interesting, but that which strikes closest home is economy and reduction in cost to the consumer. With the location of the centralized steam-electric plants at or near the mines, a shorter haul, or no haul at all, is required to bring the fuel to the plant. This saves using coal to haul coal and the freight charges to the

Cont. Israce Anderson Arb. 106 North St, W Lafayette, Ind.

1550

railroads. Incidentally, it will relieve the already congested railroads to the advantage of shippers by better service.

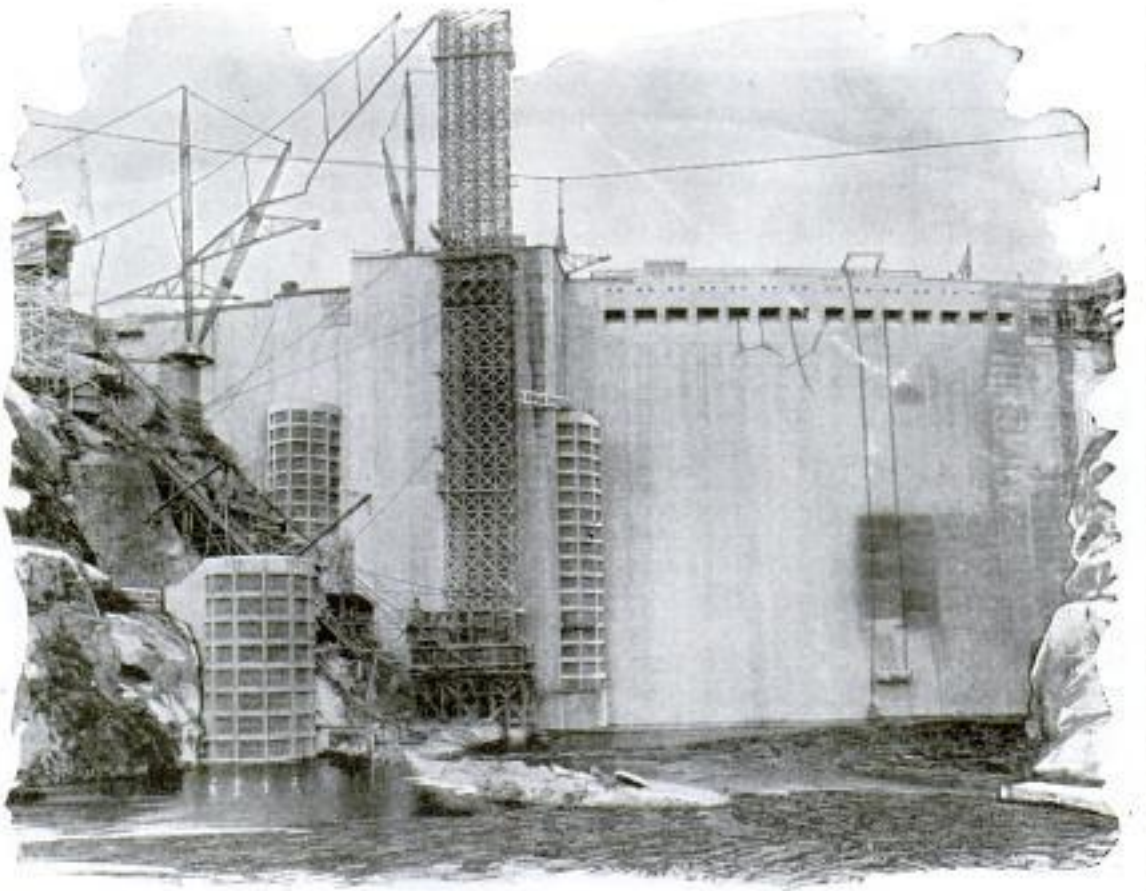
The obstacle in the way of establishing all steam-generating plants at the mines and burning the coal there, instead of hauling it to the consumer, is the absence of water. A steam-electric plant uses 400 to 500 tons of water for every ton of coal burned, and the mines where such a water supply is available are few and far between. Many electric plants in cities pump more water for their use than the city waterworks pump to supply the needs of the entire population.

The bulwark of a super-power system must be electricity produced from coal, for all the available water power in the country would not approach the nation's power requirements. A survey of the potential water power of the nation shows a possible 55,030,000 horsepower as a maximum, but because of variation in water supply between wet and dry seasons, that total will be available only half of the time.

The first cost of a hydroelectric plant is practically its only cost, for the operation is very cheap and the plan calls for the utilization of all possible water power with consequently more current from a cheaper source.

By working the steam-electric and hydroelectric plants in conjunction during the seasons when the streams are full and more current is generated by the hydroelectric plants than they can use locally, this surplus supply can be transmitted to the steam-generating plants, which in turn cut down their production and use this additional current to fill their demands. This means another saving in coal consumption as the hydroelectric current can be produced cheaper than current generated by steam.

With the linking of the various plants it will be possible for any station generating more current than can be consumed locally to sell its excess to one or more stations in the same state or other states whose demands exceed their supply. While the distance to which power can be sent profitably is limited



By Plugging Valleys with Walls of Concrete to Form Storage Basins, Water from Narrow Mountain Streams Is Garnered to Spend Its Energies in the Service of Super-Power.

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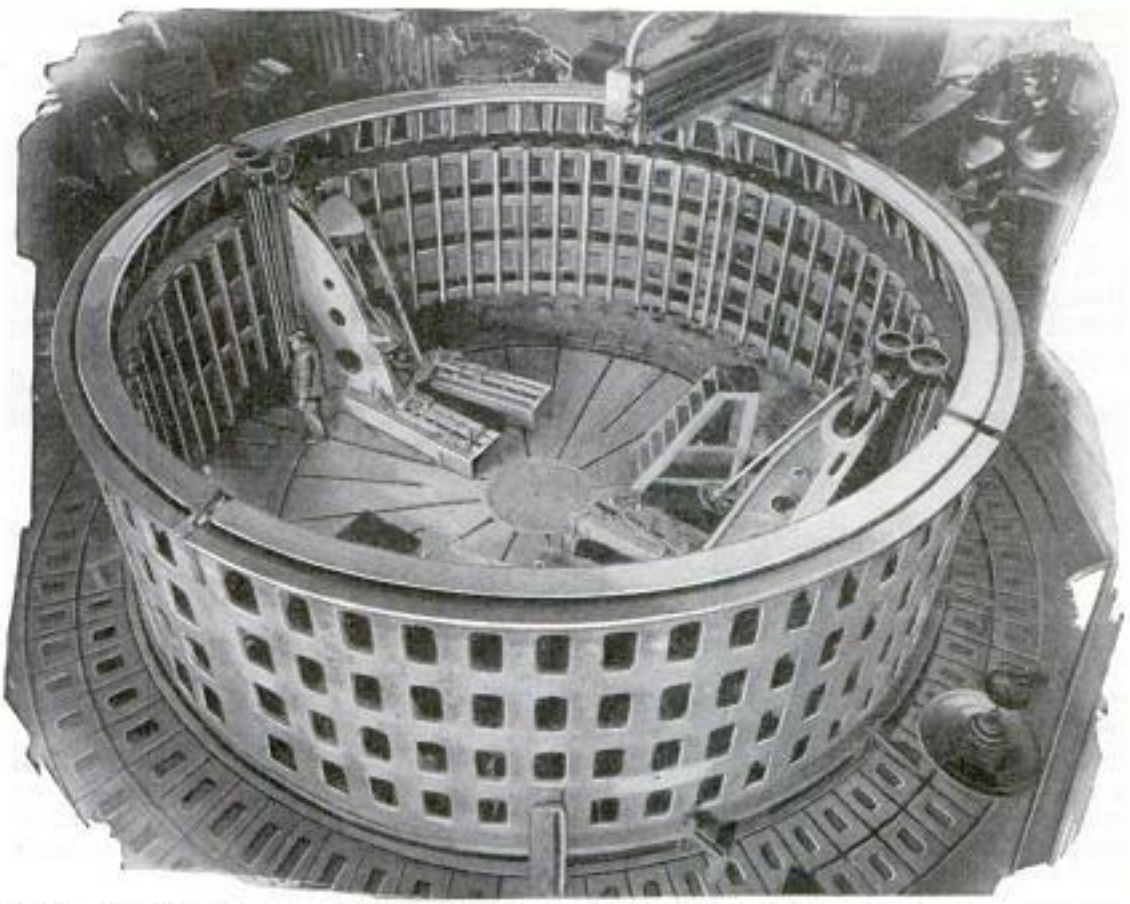

Ten-Ton Water Wheel Runner of a Giant Turbine Installation That Will Insure Steady Flow of "White Coal" to Work Ceaselessly for Farms and Factories Fed by Super-Power

to about 300 miles, yet an installation of 600 miles distant from another can supply its needs by having the power relayed through a third plant located midway.

This is already being done in New England, in the south and in the west. Interconnection and super-power have reached their highest development on the Pacific coast, where waterfalls are common and hydroelectric energy cheap. Save for a single gap of 117 miles in northern California, the transmission lines have been connected in an unbroken chain from northeastern Montana, far up near the Canadian border and down to San Diego. When that gap is closed, power may be passed along from one generating station to the next power house, and so the available supply shifted, if necessary, over thousands of miles of transmission lines to meet the demand. During the last summer, with a shortage of water in western Washington, the power company at Spokane sold its current to Seattle and Tacoma factories and purchased electricity from Montana to care for its local needs.

The ability to transport power in this manner insures a constant supply to industries with a consequent reduction in losses from interrupted production and unemployment. With the increasing development of electric power at lower cost will come the practicability of railroad electrification with an accompanying increase in efficiency and reduction in operating expense. The economy of electricity in railroad work is apparent, for when an electric locomotive comes in from a haul, it is only necessary to turn a switch in the cab and its power supply is cut off, while the fires of a steam locomotive must be kept banked if it is to go out again within a short period. This means the consumption of unnecessary fuel. It has been demonstrated that electrification cuts the cost of operation to half that of steam. This in time should reduce freight and traveling costs.

The smaller cities and towns are expected to benefit from the linking of

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these power plants through a gradual movement of industries to rural settlements where work can be done amid pleasant surroundings, far from the smoking stacks of great cities. Heretofore the cost of power in these districts has made this impossible.

The farmer can turn it to a multitude of uses with consequent greater ease for himself. On the farm it can operate milking machines, turn separators, pump water, and be used wherever power is required.

Super-power does not imply the creation of great trusts or giant monopolies, but means the linking together of all electric producing plants by transmission lines together with the establishing of great steam-electric plants at mines where sufficient water is available and taking all the power possible out of the rivers.

Today in the United States there are about 6,000 individual power and lighting systems and super-power will mean the interconnection of most of these. Such are the merits of super-power.

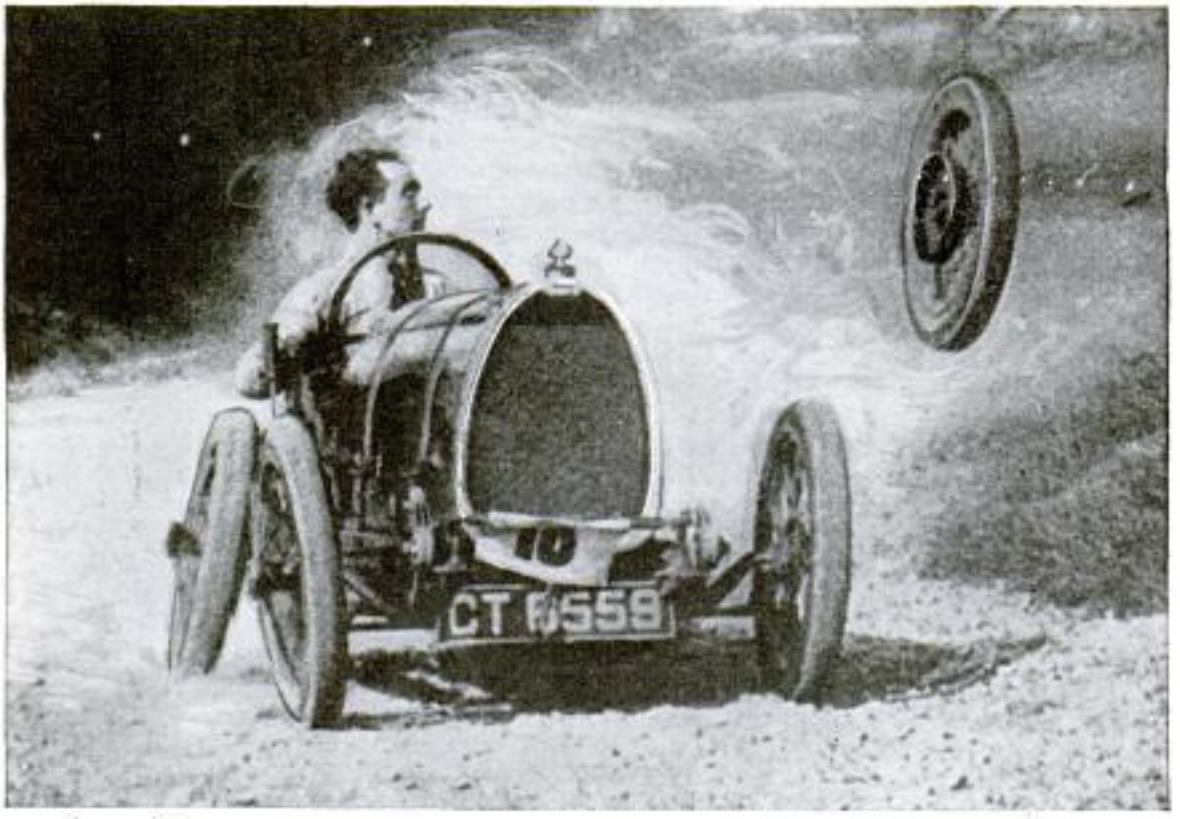
H. H. WINDSOR, Jr.

Racer Is Saved by Nerve and Skill When Auto Axle Fails

1857

Coolness and quick application of the emergency brake, probably saved an automobile racer's life when an axle snapped as he was rounding a dangerous curve in a foreign road race. The car was going at approximately sixty miles an hour when the accident occurred. As the left rear wheel went hurtling to the side of the road and the machine sagged, the driver grabbed the emergency brake lever, managing to keep the car upright and halt it within a few feet.

¶Aircraft products in the United States almost doubled in value in the two years from 1921 to 1923, according to census reports which show that the output of the industry in the latter year reached the total of $12,945,263.



This Was Luck for the Cameraman but Presence of Mind Saved the Driver; as Rear Wheel Spins Away from Snapped Axle, His Hand Reaches Instinctively for the Emergency Brake

Raymond Mays, member of South Wales Automobile Club

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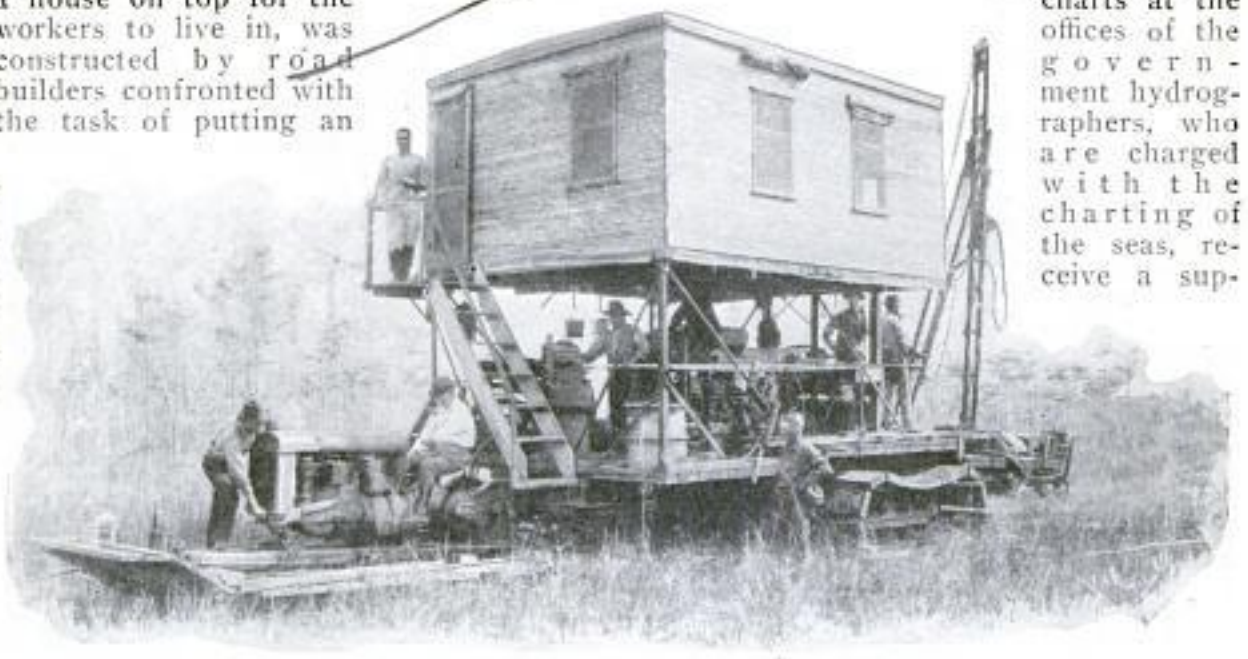
Modern Juggernaut Builds Highway through Florida Everglades

To plow through the soft muck of the Florida everglades, a versatile tractor with a house on top for the workers to live in, was constructed by road builders confronted with the task of putting an automobile highway through a twenty-mile stretch of the swampy territory. As the ground was too wet for pitching tents, the overhead house was the only solution to the quarters problem, and unusually wide endless treads had to be put on the tractor to keep it from sinking into the eight feet of soft mud. A sledge in front supported an auxiliary engine and helped make way for the dredges behind. A compressed-air drill was part of the equipment and was used to cut through the muck to the hard marl bottom below on which the foundations of the road were laid. This huge motor "juggernaut," it is claimed, did the work of thirty men and surmounted the difficulties involved in one of the most spectacular feats of road building ever attempted through the everglades.



Milling through the Muck of the Everglades, This Powerful Tractor Equipment Dug Foundations for a Highway While Workmen Found Living Quarters and Kitchen in House Above

Where Ocean Currents Go Revealed by Course of Drifting Bottles

Flasks set adrift in the seas by the navy department and the captains of ships often disclose valuable information concerning the existence and direction of ocean currents, when picked up sometimes years after they have been tossed into the water. One of these silent explorers was taken from the sea off the north coast of France, and from a note sealed within, it was learned it had been dropped overboard in the middle of the Atlantic east of Newfoundland 328 days before. In that time the bottle traveled approximately 1,500 miles. Sea captains applying for pilot charts at the offices of the government hydrographers, who are charged with the charting of the seas, receive a supply of the bottles and printed forms which they fill in and seal in the flasks that are thrown into the seas during voyages to other climes. If found, the floaters are immediately forwarded to the points indicated on the messages, together with the date and locality at which found.

Spring Holder for Auto Tail Light Protects Lamp from Jars

Tail lights for trucks, trailers or any kind of automobile are kept from breaking in a holder with four springs by which the lamp socket is suspended within a strong sheet-metal frame. The fixture is designed especially for vehicles where heavy jars may extinguish the light without the driver's knowledge. The springs are said to absorb the shocks, thus affording ample protection for the lamp. The socket is shaped to fit any ordinary style of tail light, and the frame is nickeled or enameled.

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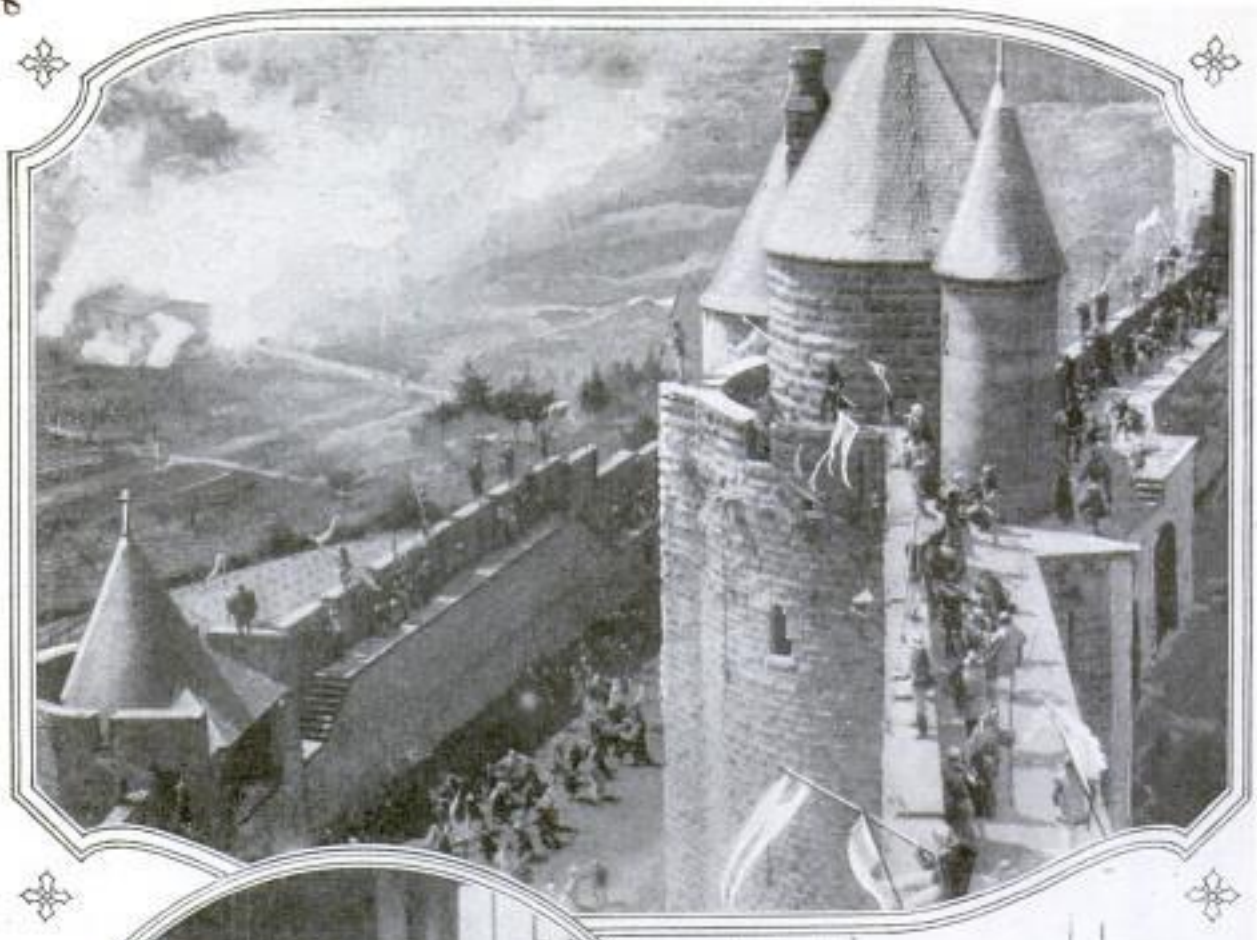
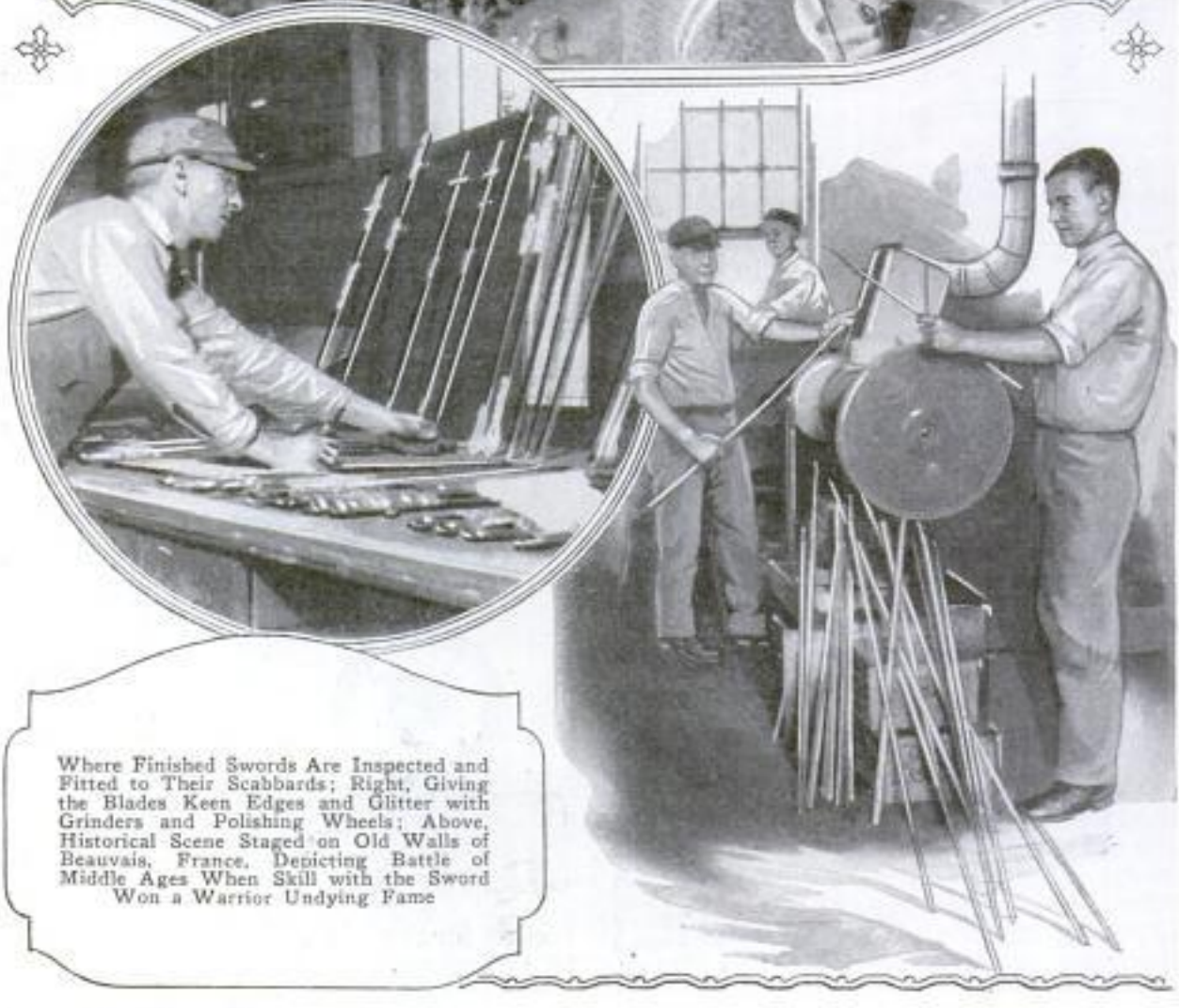
1918





Where Finished Swords Are Inspected and Fitted to Their Scabbards; Right, Giving the Blades Keen Edges and Glitter with Grinders and Polishing Wheels; Above, Historical Scene Staged on Old Walls of Beauvais, France, Depicting Battle of Middle Ages When Skill with the Sword Won a Warrior Undying Fame

Copyrighted material

1918 Pettibone Co, Cincinnati, Ohio

Sword Making as a Peacetime Art

Graceful Blades, Now Only Mark of Military Rank, Get Romantic Glitter at Hands of Skilled Metal Workers

UNLIKE the flashing blades that a few centuries ago fashionably ornamented the belts of adventurous swashbucklers and swarthy buccaneers who peddled their fighting skill wherever gold was to be had in exchange for prowess, the swords of today are seldom to be seen serving as weapons in the hands of those whose military rank or equipment they grace.

Though once an instrument of deadly purpose, the sword has in recent years been relegated to an almost obsolete position as a weapon of warfare by the introduction of powerful, long-range small firearms which make close-up combat a rare occurrence. For such situations during hostilities between armies, the formidable bayonet has been attached to rifles of foot soldiery and hand-thrown missiles, terrible in their effect, have made exposure of troops highly dangerous when in close contact with an enemy force. Despite its passing from use as an implement of attack or defense, the fighting blade now serves almost universally as a prominent part of military dress and ornamental regalia of uniformed organizations and societies. But they are more often to be seen flashing from bejeweled scabbards or flourishing in the hands of functionaries of the royal courts of the Old World, during ceremonies of pomp and splendor for which custom has made the use of swords almost indispensable. To meet such demands as these for blades of all kinds, many factories employing hundreds of sword makers are occupied constantly, turning out thousands of sabers, rapiers and scimitars, some of which are so richly ornamented that their values run into the thousands of dollars.

Only the best steels are used in the art of sword making. In this country almost all of the materials from which both blades and scabbards are manufactured are produced by mills where specialists long experienced in the craft have developed metals equal to those used by the most famous sword makers of foreign countries, many of whom are descended from artisans highly skilled in such work.

Where the blades were once beaten into shape by hand, powerful machinery now accomplishes practically every bit of work. Polishing, etching and sharpening are done with wheels and acids that bite into the hard metals in practically a thousandth of the time devoted to the tasks by the ancient armor makers, whose reputations were based on their skill and ability to turn out a strong blade as well as an artistically finished one. The raw materials reach the factories in the form of sheets of cold-rolled steel. These are stamped out into shapes of the general dimensions of the finished scabbards, for it is the sheath that as a rule is first wrought. The cut piece is then put into a heavy

Medieval Knights and Soldiers Depended Almost Entirely on Their Skill with Swords to Decide the Outcome of Battle

Copyrighted material

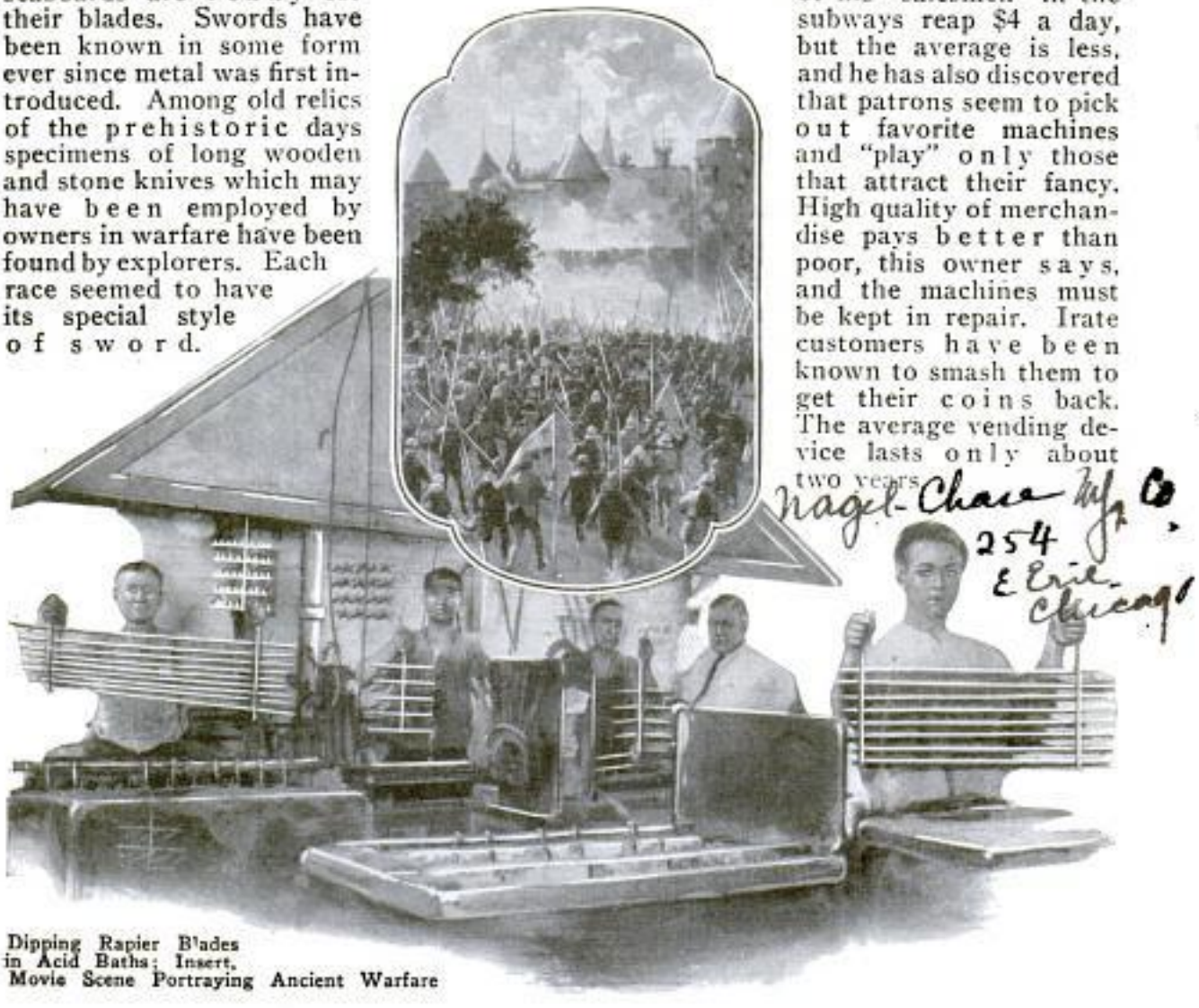
New York Times 10/10/24

machine which exerts powerful pressure to fold the two edges together. This done, a wire of brass is run down the flattened tube along the seam, and the article is placed in a bath of borax to soften the strand so it can be easily forced into the narrow crevice where the keen edge of the blade is to rest. This preparation protects the sword edge from injury when drawn and thrust into the sheath. Firmly bound into a strong solid piece, with bands of tough metal, the scabbard is surfaced on several grinding wheels and polished, and colored with acid baths. Seams are ground by careful workers who handle it delicately to prevent cutting through the thin wall of steel. A heavy steel mantle, or case, is then pressed over this lining to protect it and afford a surface on which any amount of scrolled designs or inscriptions can be etched. It is on this casing that the polishing wheels produce the mirrorlike glint, which is reflected by a coating of nickel-plating. After a few deft touches the scabbards are ready for their blades. Swords have been known in some form ever since metal was first introduced. Among old relics of the prehistoric days specimens of long wooden and stone knives which may have been employed by owners in warfare have been found by explorers. Each race seemed to have its special style of sword.

Slot Machines as Silent Salesmen Serve Thousands Daily

Daily serving the public at railway stations and other places, with thousands of vending machines that dispense everything from sandwiches and all-day suckers to shoe shines, newspapers and cigarets, has become one of the most carefully organized catch-penny industries in the world. Outfits are sold outright or leased by the manufacturers to men who operate strings of the machines. They, in turn, usually have contracts with candy and gum makers to sell only their product either on a commission or percentage basis. The art of putting the machine where it will catch the most trade has been carefully studied. An owner of 400 slot devices in New York has found that the suburban-station platform is the best location. He has also discovered that the addition of a mirror is a sufficient lure to attract a fourth more receipts than are usually taken by a plain machine. Some of his "salesmen" in the subways reap $4 a day, but the average is less, and he has also discovered that patrons seem to pick out favorite machines and "play" only those that attract their fancy. High quality of merchandise pays better than poor, this owner says, and the machines must be kept in repair. Irate customers have been known to smash them to get their coins back. The average vending device lasts only about two years.

Nagel-Chase Mfg Co
254 E Erie Chicago



Dipping Rapier Blades in Acid Baths; Insert, Movie Scene Portraying Ancient Warfare

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Research Bureau, (Bulletin)
National Lumber Manufacturers
Association

Wooden House Costs Less to Heat, According to Practical Test 1974

To determine the cost of heating homes of various materials, a test has been made in Norway with twenty-seven models built of different materials by measuring the amount of electricity required to keep each at a uniform temperature. Floors, ceilings, double windows and doors were alike in all the houses, the only variable feature being the construction of the walls. Each of the models was about six and a half feet square and eight feet high. The most economical to heat was found to be a lumber-built house having the hollows of the walls filled with sawdust. It was stated, however, that the sawdust must be dry to be an efficient non-conductor of heat and before its use can become general, some means must be found to make it dry and damp-proof. It was found that hollow walls are better heat insulators than solid walls.

Auto Limousine with Seats for Six Has Body Shaped like Plane 1858

With a long, narrow streamline body, somewhat like the fuselage of an airplane, and flat, protruding mudguards, resembling small wings, a novel limousine of German make attracted considerable attention when it arrived in London. Sloping top, six-seat arrangement inside and absence of rear doors were other departures in the vehicle which bore interesting evidence of the influence aircraft design has exerted on automobile construction.

German Limousine of Latest Type, Showing Influence Airplane Already Has Exerted on Automobile Body, Mudguards and General Design

Wide World Photos
229 W. 43rd St. New York

Hitching Posts Serve as Policemen to Enforce Traffic Rules 1590

Set in blocks of concrete and fitted with warning signs, quaint old hitching posts that suggest the days of the surrey, are being put to good use in an eastern city as motor traffic "policemen." Their silent message is legible at night by the addition of a lantern and the bulky block, set in the middle of the street and painted white with its broad black-lettered sign, is said to command the respect of even the most heedless motorist.

© Keystone

Railways Saving Millions Yearly by Use of Longer Trains 1957

More than $100,000,000 has been saved by the nation's railways in the past year through increasing length of trains, pulling heavier loads and the use of cheaper coal, according to estimates. For the first half of the year the saving in fuel was almost $15,000,000. Old engines have been gradually retired from service and new cars and later types of locomotives developed greater hauling capacity, permitting longer trains with heavier loads to be operated without any material increase in consumption of coal. Most of the railroads are carrying on fuel-saving campaigns through classes made up of employes who receive instruction in the handling of coal from experts.

11-7th Ave
New York

New York Times
10/6/24

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Wide World Photos, 229 W 43rd, New York

Any Day in Amsterdam, Bicyclists Are Said to Outnumber Motorists or Pedestrians

Exposure Meter like Watch Gives Exact Time for Photos

To make sure that the proper exposure is allowed in taking pictures, a watch-shaped pocket meter has been devised for the amateur and professional photographer. It is operated by first pressing a small button at the side before opening the case. This movement exposes a small section of sensitized paper. The time it takes this paper to turn the same color as a fixed tinted piece next to it, is then computed by counting or by a watch, commencing the instant the case flies open. This gives the number of seconds that should be allowed. On the other side of the case is a figured dial with a rotating center section which

Exposure Meter Open Showing Side Button, Sensitive Paper Slot, Dials and Directions

shows the different speeds for various kinds of film and the different stops.

More Bicycle Riders than Walkers Seen on Street in Holland

That the bicycle is still popular in Europe as one of the most economical means of quick transportation is proved by a photograph of a street in Amsterdam which shows more riders than walkers. Because of the high cost of gasoline, the use of motor cars abroad is confined to the more wealthy. Last year, American firms are reported to have manufactured more than 350,000 bicycles, or about twice as many as were made in 1921, and exportations and the number used at home are said to be increasing each year.

Largest Motorship Provides Space for Nine Hundred Passengers

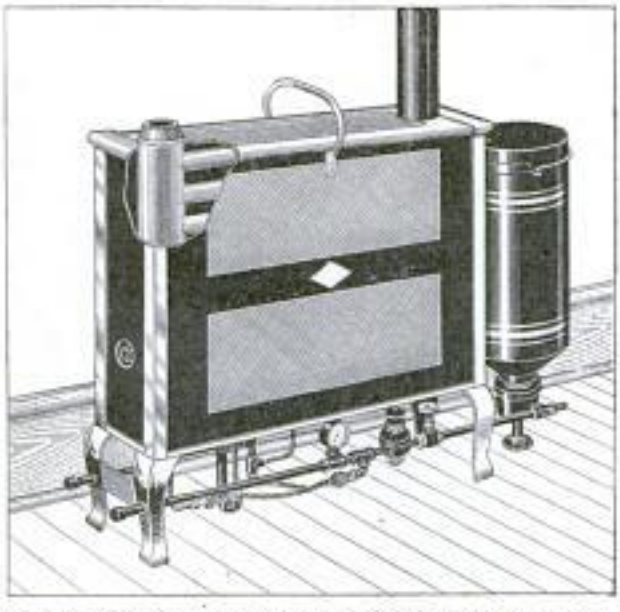
Six hundred feet in length, with a beam of seventy-two feet and a displacement of 23,000 tons, the world's largest motorship, the "Aorangi," was built in England and equipped with a Diesel-engine installation nearly three times as powerful as any previously used. The exterior looks no different from that of any other big ocean liner, except for the absence of the huge smokestacks, and the substitution of half a dozen tall exhaust pipes, comparatively

Copyrighted material

slim, which rise from the sides instead of amidships. Maintaining an average speed of seventeen knots, the total fuel consumption, including all auxiliaries, is estimated at sixty tons of oil per day, as compared with 150 tons in an oil-fired geared-turbine steamer of the same capacity, while the latter would have to be at least twenty-five feet longer to give the same passenger and cargo space, on account of the greater bulk of engines and fuel. The "Aorangi" will have space for 950 passengers and 400,000 cubic feet of cargo and will be used between Vancouver, B. C., and Australasia.

Oil Radiator Has Silent Burner and Only One Control

For some time there have been heating radiators operated with gas burners and now there is being manufactured an oil-fired radiator. For the present, it is designed specially for use in garages and service stations where oil is more easily available than gas. It is noiseless, at least as much so as a gas burner, and leaves no carbon deposits. There is an oil injector and an air injector, but, as the oil is brought into the combustion chamber by means of the air, and always in proper proportions, only one control is needed. This is done with a pressure valve. Unlike any form of bunsen burner, the flame cannot possibly flash back into the mixing tube. The burner consumes between one and two pints of distillate an hour, and, it is claimed, will operate with any oil that will flow.



Radiator Heated by Oil Burner Specially Adapted for Garages and Service Stations

Sanitary Shaving-Lather Sprayer Eliminates Use of Brush

Using either liquid or cake soap, a sanitary lathering appliance for shaving has been invented to eliminate the brush and avoid danger of infection from its use either in barber shops or at home. The soap, to which a little water is added, is held in a small container which is provided with a lever. Pressure on this causes a spray of ready-mixed lather to form. It may be applied with the hand or administered directly to the face from the nozzle of the sprayer.

Working Up Shaving Lather Directly from Sprayer into Hand without Use of Brush

Model of Forest Built from Fossils Shows Tree Life Centuries Ago

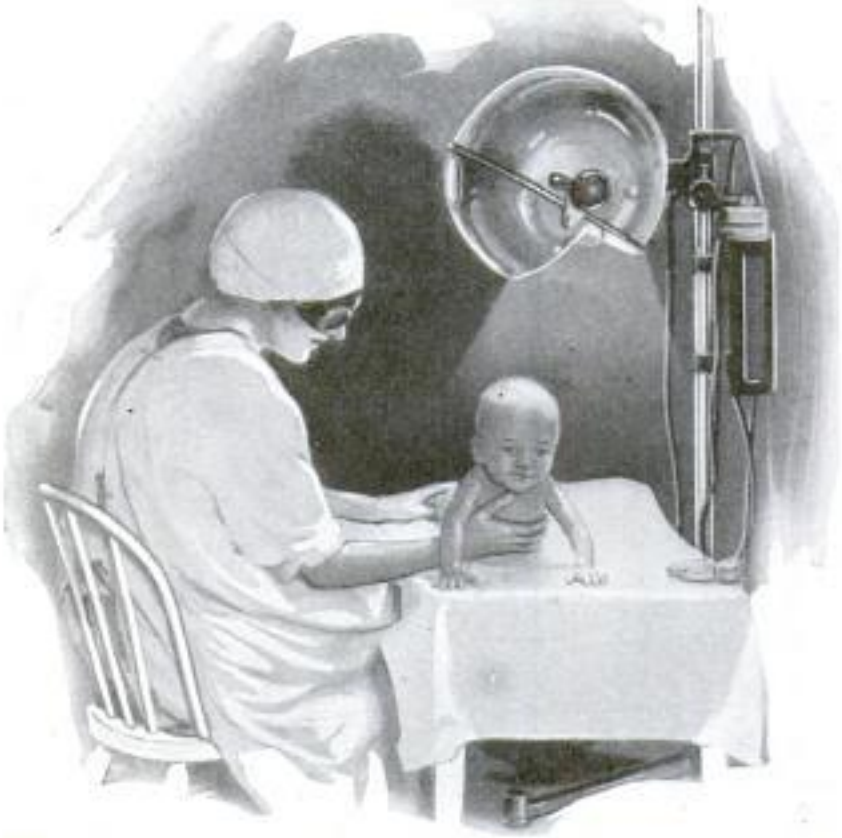
Typical forest life as it is supposed to have flourished on this continent not less than 300,000,000 years ago is pictured in a model built by scientists of the New York state museum at Albany from fossil parts of tree trunks found while excavating for a dam at Gilboa. Workmen first stumbled upon the petrified bases of the trees while digging rock. Later, under the guidance of skilled geologists, bits of the branches were revealed. Using these remains as the foundation, fossil imprints of leaf formations of early periods and other data were combined to complete the model. A painted and sculptured superstructure and background were arranged about the trunks in a natural manner.

Copyrighted Material

New York Nursery and Child's Hospital
161 W. 61st St. New York City
1892
See 570 - April, 1925

Artificial Sunlight Baths for Babies Given to Cure Disease

For the treatment of sickly and tubercular children at a New York hospital, a mercury lamp which sheds light said to have the healing properties of sunshine, is used. The material of which the lamp is made is such that only the curative rays from the light are permitted to pass through. In treating the tiny patients, a skilled nurse, her eyes protected from the glare with dark goggles, exposes the child directly to the light which shines down from a metal reflector attached to a movable stand. Baths in this glow are declared to produce beneficial results toward curing various ailments.



Giving Baby an Artificial Sunlight Bath in Rays Shed from Mercury Lamp and Focused by Special Reflector

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Steel Houses That Cost but Little Can Be Erected in Few Hours

1931

As a solution of the housing problem in Great Britain, a manufacturer has devised a standard three-room dwelling which he says can be built for $1,500 and erected in a day after the concrete foundations have been completed. Brick, mortar and other materials are almost entirely replaced by sheet-steel sections, bolted to a wooden framework and so arranged that skilled labor is not needed to put them together. Between the inside and outside pieces, felt lining is applied to keep out moisture and to insulate against changes of temperature. The outer walls are painted and the interior is lined with beaverboard. Roofing is of slate or any fireproof composition. A feature of the plan is that the services of a plumber may be dispensed with, as the piping is designed to be screwed instead of soldered together. The estimated cost includes electric-light fittings, bathtub and fireplaces.

New York World 9/28/24
Glasgow Steel Roofing Co. and William Beardmore & Co. Ltd. Glasgow Scotland

1967

Calipers for Auto Balloon Tires

To determine quickly and accurately if balloon tires have been properly inflated, a novel gauge, somewhat like a machinist's caliper, has been devised. It tells instantly if the pressure is suited to the load that the tire has to support and eliminates the possibility of mistakes in reading ordinary testers. The device is made of stamped metal and has two sliding jaws between which is a perforated crosspiece for regulating the distance between the ends of the points. The measurement is made at the greatest width or bulge in the tire near the point of road contact.

With the pin set at the proper hole, corresponding to the size of the tire used with the car loaded to its normal amount, the instrument is slipped on and air let in or out until the ends of the jaws fit easily over the bulge of the tire. With this gauge, both rear and front tires may be correctly inflated to suit the different loads they carry. When not in use, the calipers fit flat in the map pocket or may be carried under the seat cushions.

Kelly-Springfield Tire Co 250 W. 57th St New York.

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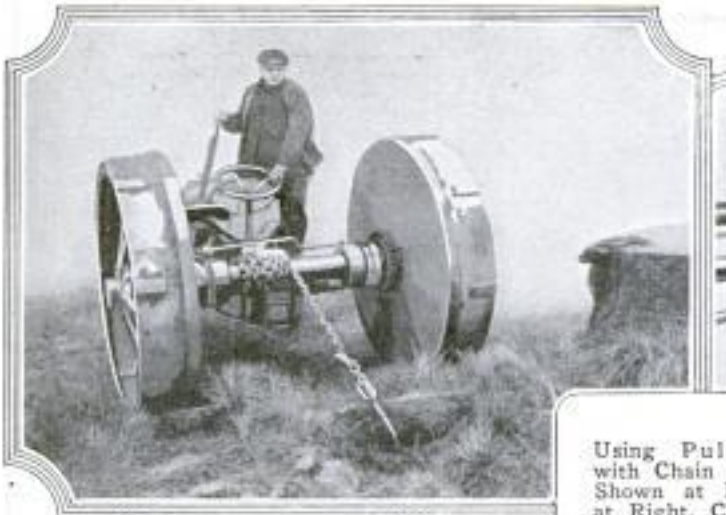
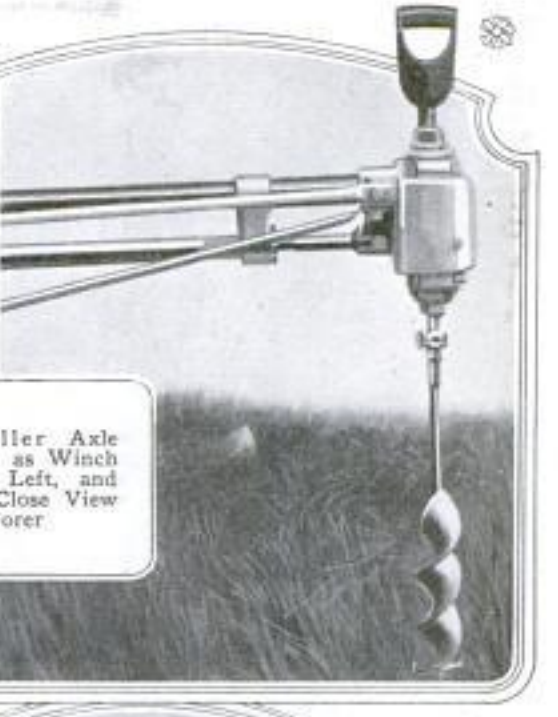
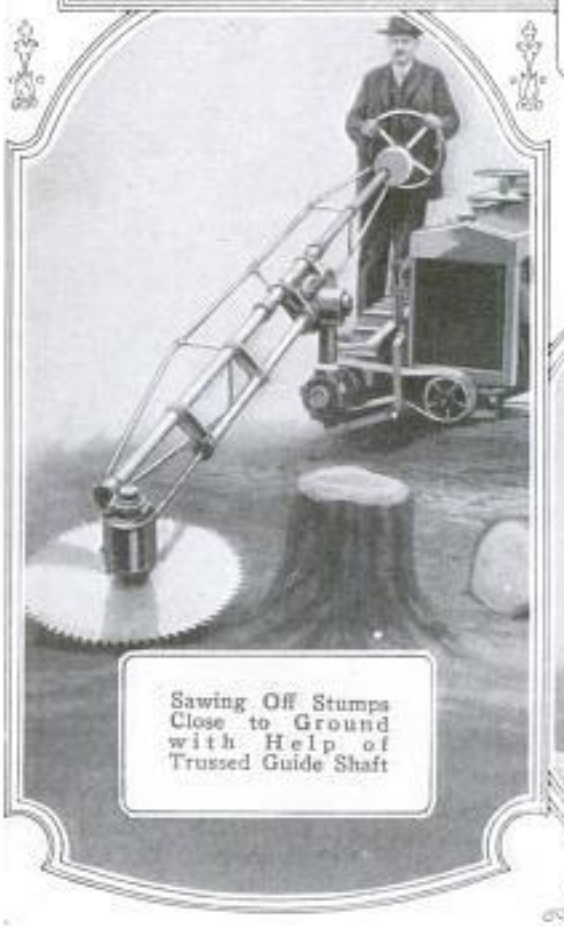
Mfg. O. L. Holt, ~~223 S. Water St.~~ Portland, Oregon. 1841
200 E. 9th St.

TRACTOR, SAW AND STUMP PULLER RECLAIM LAND

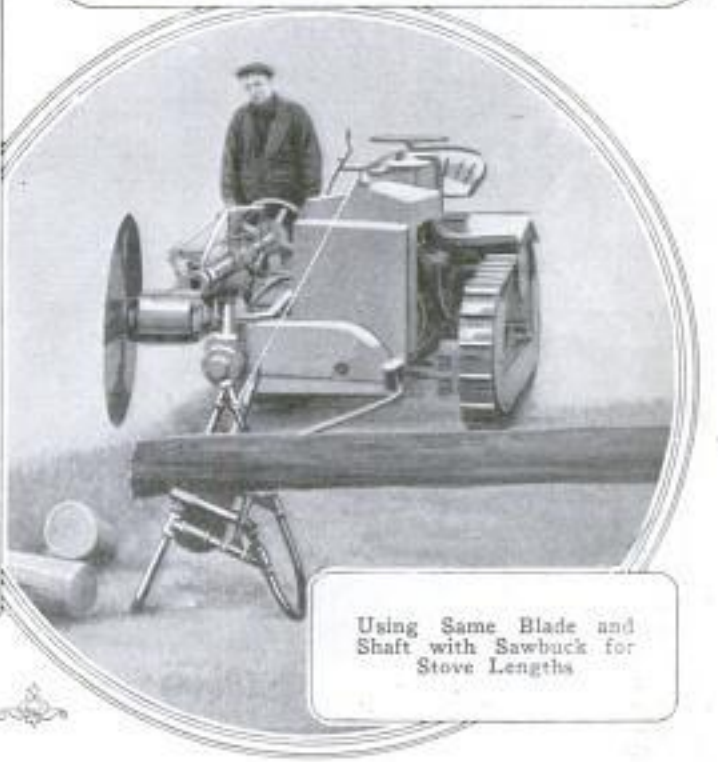




Using Puller Axle with Chain as Winch Shown at Left, and at Right, Close View of Borer



Sawing Off Stumps Close to Ground with Help of Trussed Guide Shaft



Using Same Blade and Shaft with Sawbuck for Stove Lengths

To reduce the expense of reclaiming logged-off lands, lighten the labor involved and speed the operation, a western firm has placed on the market a battery of land-clearing machinery which not only rids the acres of stumps and brush but salvages any timber that may have commercial value. The outfit consists principally of a versatile tractor saw and a powerful stump puller capable of exerting a force of from 30,000 to 40,000 pounds. The saw has a large circular blade and is attached to an endless-tread tractor. By means of a trussed shaft, the blade may be swung to almost any position. The equipment also includes a boring attachment for making holes in stumps for blasting, loosening the earth before pulling or digging post holes. The powerful puller handles stumps and roots of almost any size and also drags them off the ground. Power may be applied to wheels or axle.

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1673 Irving Escallway, 118 E 28th St New York City

When Iron Workers Unfurl the American Flag above the Topmost Beam to Denote the End of Their Task, Concrete Men Are Not Far Behind, with Stone Masons Closely Following Them

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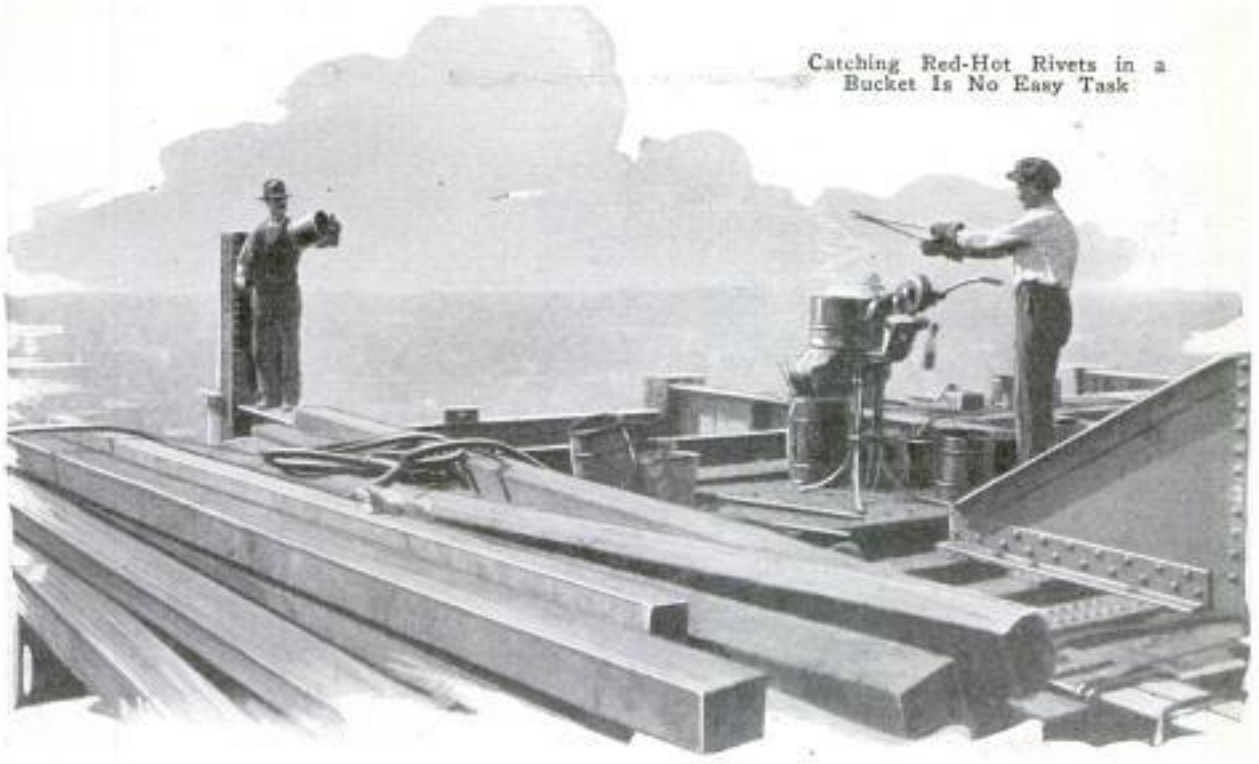

Catching Red-Hot Rivets in a Bucket Is No Easy Task

Building a Modern Skyscraper

Products of Quarries, Mines and Forests Assembled by Skilled Crews on Schedule Time

THE growth of a great skyscraper from the first excavations to the building of the stone walls around the steel skeleton, is one of the greatest feats of modern engineering. To the city dweller to whom the sight is an everyday occurrence, there still remains an endless fascination in every step, from the digging of the basement, by steam shovels, to the placing of the last stone.

Modern skyscrapers go up so rapidly that the progress can be measured with the eye from day to day, which adds interest to the game of watching the workmen. The steelwork rises into the air on a fixed schedule, so many feet per day, so efficiently is every detail planned.

For instance, two men named "Jimmie" erected the steel for a thirty-eight story building in 114 days. Without help, they placed each column, girder and beam in place and bolted the ends to hold until the rivet gangs could complete the job. There were 6,900 tons of steel in the towering skeleton. It was not accident that both the "connecters"—the title they bore on the contractor's payroll—had the same name. The elder was Irish and was Jimmie by accident, but the younger was Swedish and was Jimmie by choice. The reason is that the first connecter, old in years at what is essentially a young man's game, insists that his partner must bear the same name, and when one "Jimmie" quits, work halts until the contractor finds another to take his place.

The connecters are the monarchs of skyscraper construction. The reason there were but two men to place all the steel in the giant building was that the floor area was small enough for a single derrick with an exceptionally long boom to reach every corner of it. For each derrick used there must be two connecters, in an erecting crew of seven men, the others including the foreman, engineer, hoisting engineer, and the two hookers who attach the cable to each piece of steel on the ground, sending them aloft in the order in which they are needed.

The building of a modern office skyscraper requires relatively few men on the scene, but back of them is the combined work of hundreds or thousands of others. In the ore mines of Minnesota dynamite, steam shovels, railroad crews and muckers get out the iron ore and start it down the lakes in steamers, bound for the steelmills

Copyrighted material

1673

of Pittsburgh or Youngstown or the Chicago district. At the mills the metal is extracted, and from the furnaces pours as molten steel into the ingot molds, to be rolled into bars and billets. At the fabrication plant reheating and more rollers reduce the steel to beams, ready to be drilled for the rivet holes. In the limestone quarries of Indiana channeling machines, driven by steam, cut out huge blocks of stone, some to go to the saws to be cut into plain blocks for the plain wall surfaces, and others to column-fluting machines or hand carvers to be fashioned into the delicate ornamental parts. In the marble quarries of Vermont and Italy other men are getting out the stone for interior finish. Cement quarries are reducing the rock to building material; sand dredges collect the aggregate; lumber for forms is cut from trees in the northwest; and from half a dozen countries fine hard woods are ordered for interior paneling. Back of all their preparation lies the work of the artists and draftsmen and architects who conceived the design and executed the plans, and they in turn were followed by the substructure workers who dug down to bedrock and built the foundations. Drawing the plans and preparing the specifications for modern buildings is a highly specialized work. One draftsman does nothing but design plumbing installations, another handles the electric wiring, one the steam fittings, and another the structural details. Then there is a draftsman who takes care of the architectural planning, and as many as five who do nothing but create the exterior designs, passing them on to others who develop the various schemes.

An average architectural office specializing in big buildings will have as many as three men who do nothing but write specifications, another man to obtain bids and let subcontracts, and still another to see to the execution of the contracts and direct the corps of building superintendents. With the plans drawn and contracts let, the first task is to build the foundations, which, in modern skyscrapers, must go down to bedrock. Thirty years ago, in the early days of tall buildings, modern caisson construction had not been developed, and buildings were erected on cribwork or forests of wooden piles. The result was that they slowly settled as the multitude of sewers, conduits and tunnels under the streets drained the water away from the surrounding earth and allowed it to compress. With the lower foundations in place, work begins on the basement or rather basements, as there are usually from four to eight floor levels underground. Once the substructure is in place, the Jimmies of the construction gang arrive.

Riding Giant Latticework Pillar toward the Clouds Is All in the Day's Work for the Connecters

As soon as the steel structure gets started upward, the carpenters and cement men follow with their forms and liquid rock. The cement casing serves a dual

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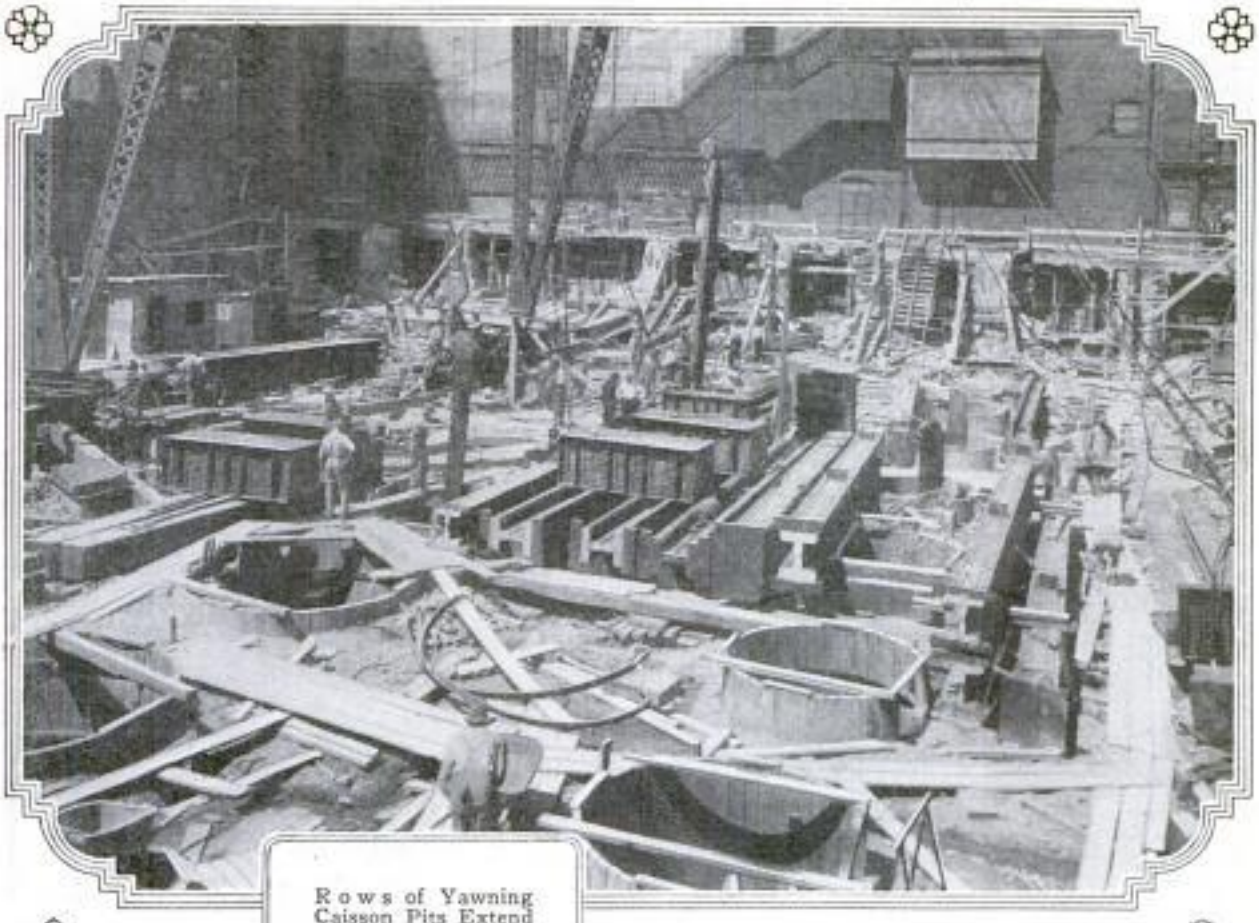
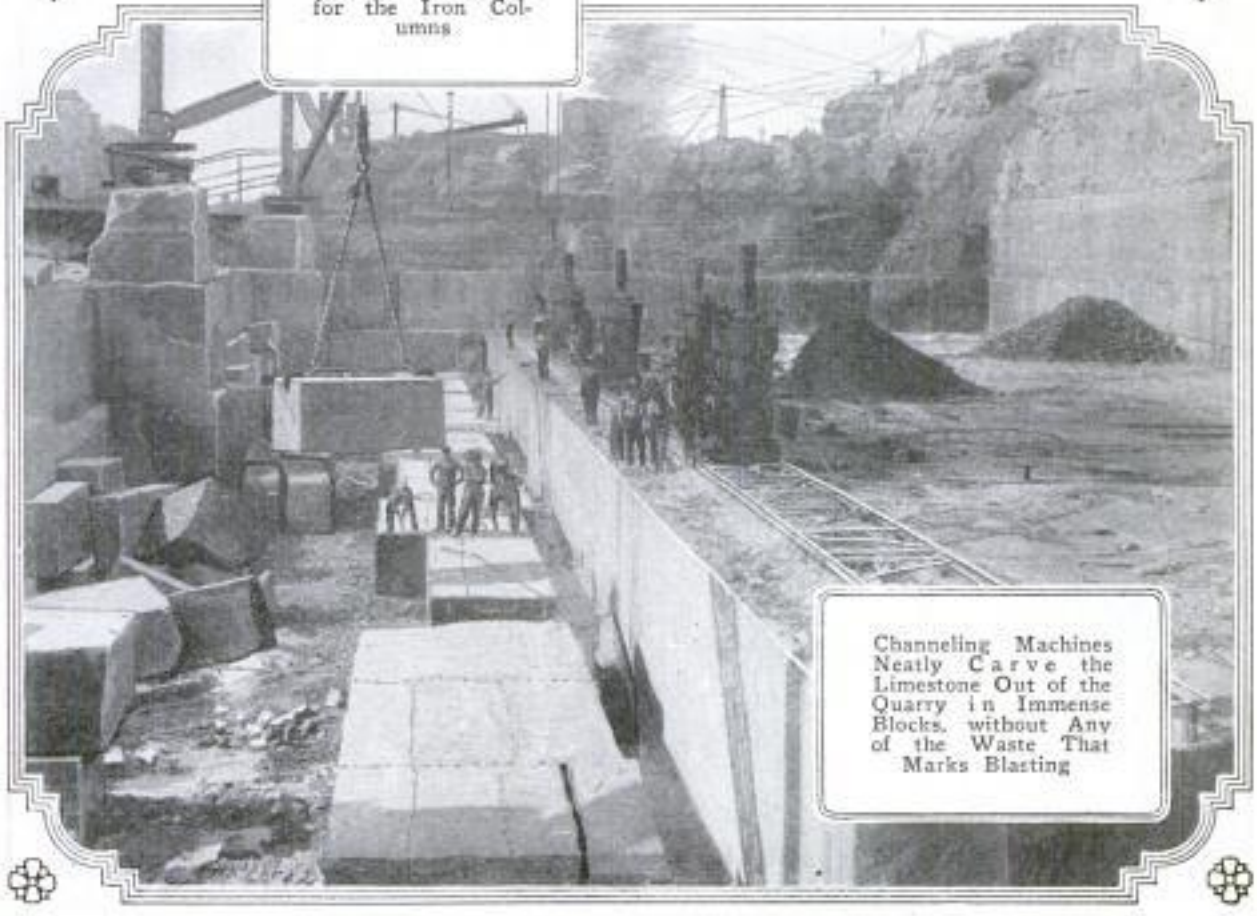


Rows of Yawning Caisson Pits Extend More Than 100 Feet Down to Bedrock, to Give a Firm Base for the Iron Columns



Channeling Machines Neatly Carve the Limestone Out of the Quarry in Immense Blocks, without Any of the Waste That Marks Blasting

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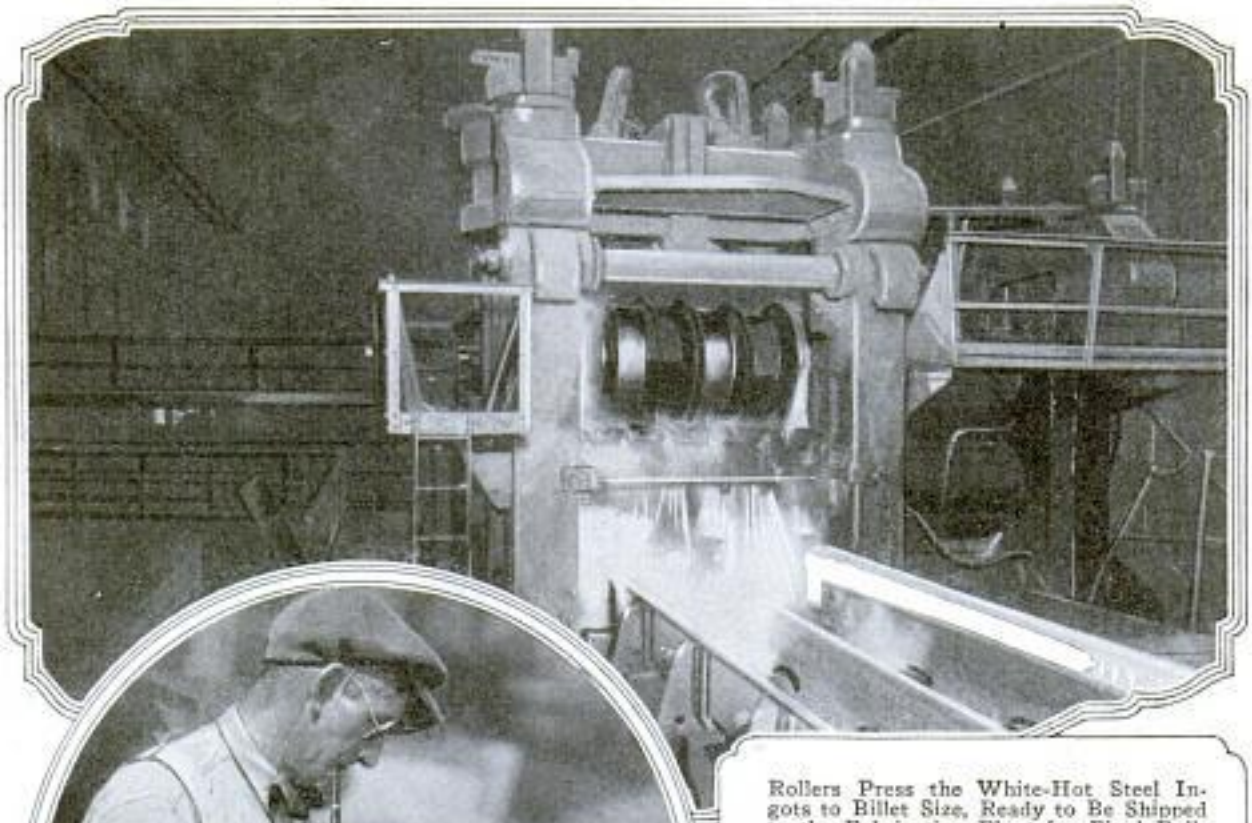
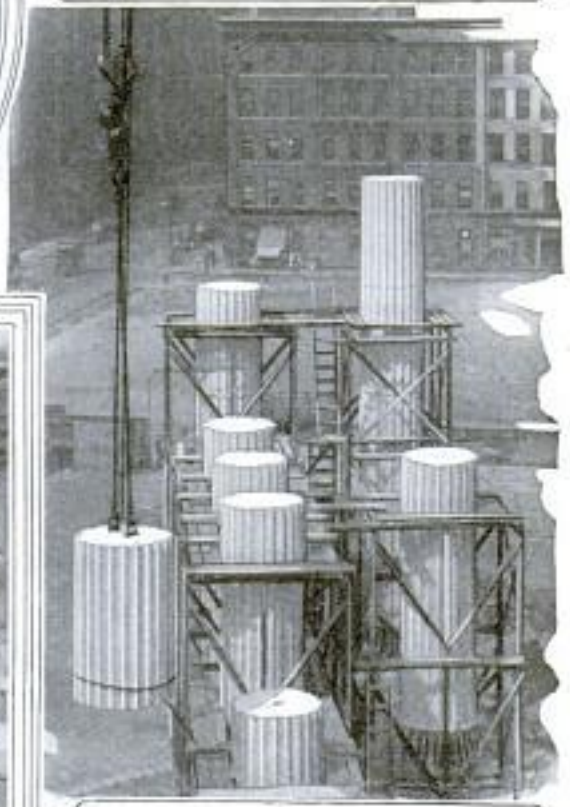


Rollers Press the White-Hot Steel Ingots to Billet Size, Ready to Be Shipped to the Fabrication Plant for Final Rolling and Manufacture into Beams



Hundreds of Blueprints Hang in the Office of Construction Superintendent

Placing the Twenty-Five Ton Column Sections for New York's New Courthouse; in Circle, Stone Mason Resurfacing Granite Block with Hand Tools to Provide Anchorage for Ornaments

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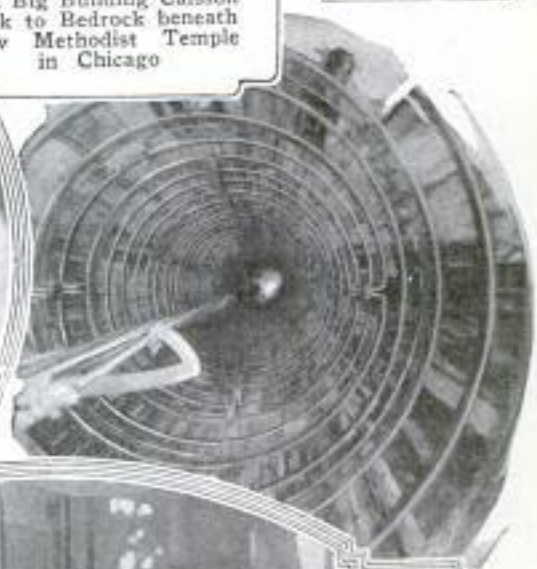
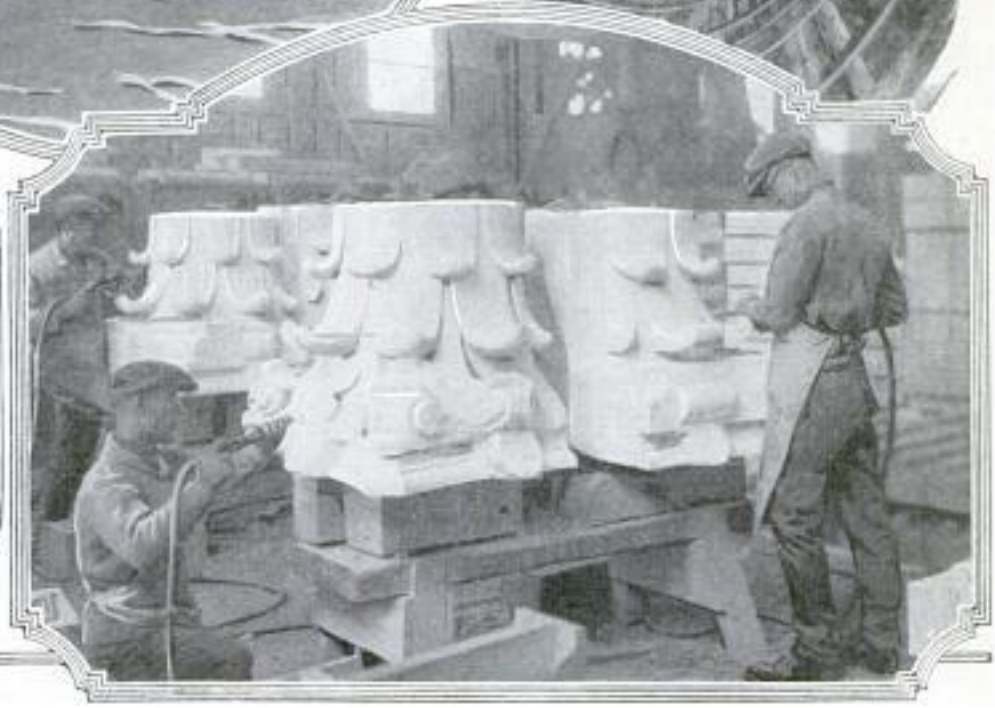
Drafting Room in the Office of a Skyscraper Architect; Below, View Down the 110-Foot Shaft of a Big Building Caisson Sunk to Bedrock beneath New Methodist Temple in Chicago





Cornice Workers Kneel on the Ragged Edge of Space While They Ply Soldering Irons High above the Street Level; Right, Using Pneumatic Chisels to Carve the Capitals of Tall Stone Columns

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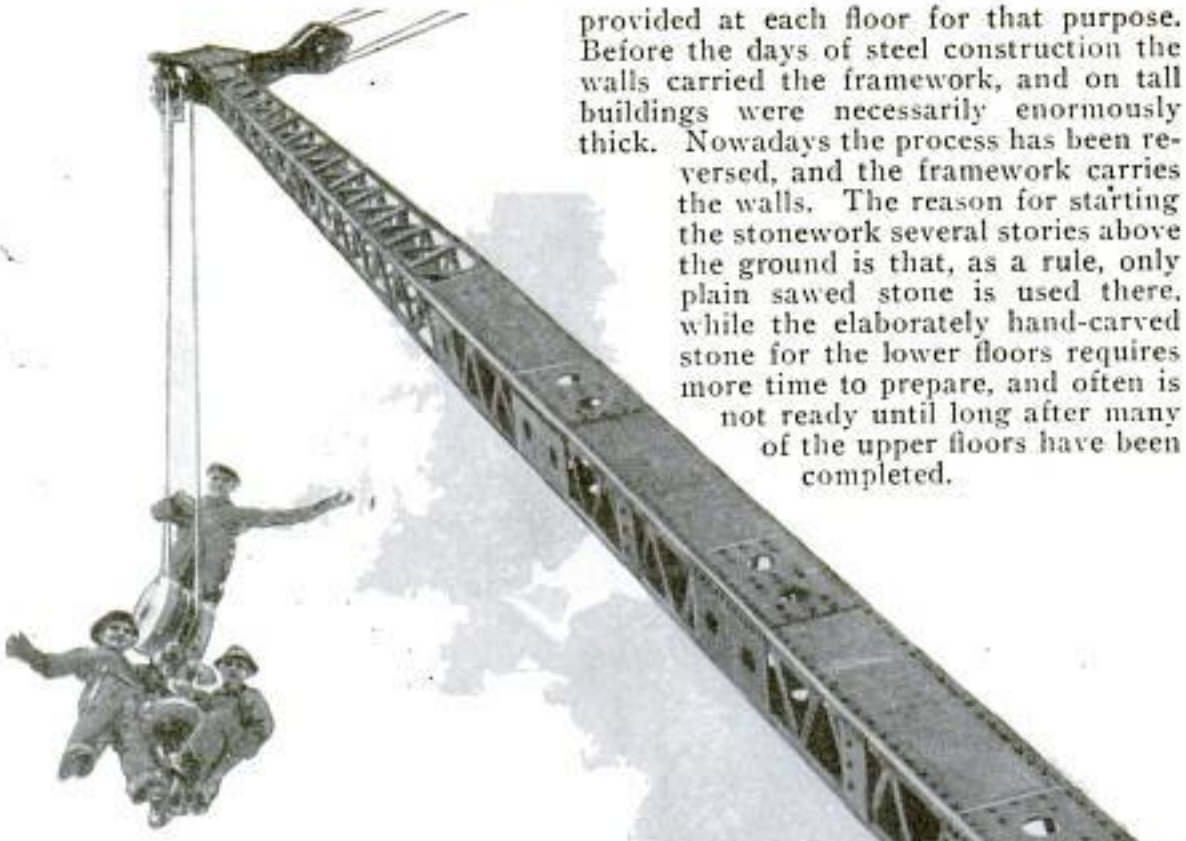

provided at each floor for that purpose. Before the days of steel construction the walls carried the framework, and on tall buildings were necessarily enormously thick. Nowadays the process has been reversed, and the framework carries the walls. The reason for starting the stonework several stories above the ground is that, as a rule, only plain sawed stone is used there, while the elaborately hand-carved stone for the lower floors requires more time to prepare, and often is not ready until long after many of the upper floors have been completed.

purpose. It fireproofs the steel to prevent its melting under intense heat, and likewise adds rigidity to the building. The last is by no means the least important, and it is for this reason that the cement forms follow so closely after the erection crew. If the ironworkers get more than six floors ahead of the cement gang they must stop until the formers and concrete mixer catch up, as it is impossible to work on a swaying steel skeleton until it has been braced.

Even when working only six floors ahead there is considerable swaying, and a slender skeleton of steelwork will "buck" as much as six inches when the derrick picks up its load hundreds of feet below on the ground.

The stone masons follow the cement men, and it is not at all unusual to see them start their work five or ten stories in the air, resting the stone on steel ledges

Five Hundred and Fifty Feet above the Street, but Unafraid

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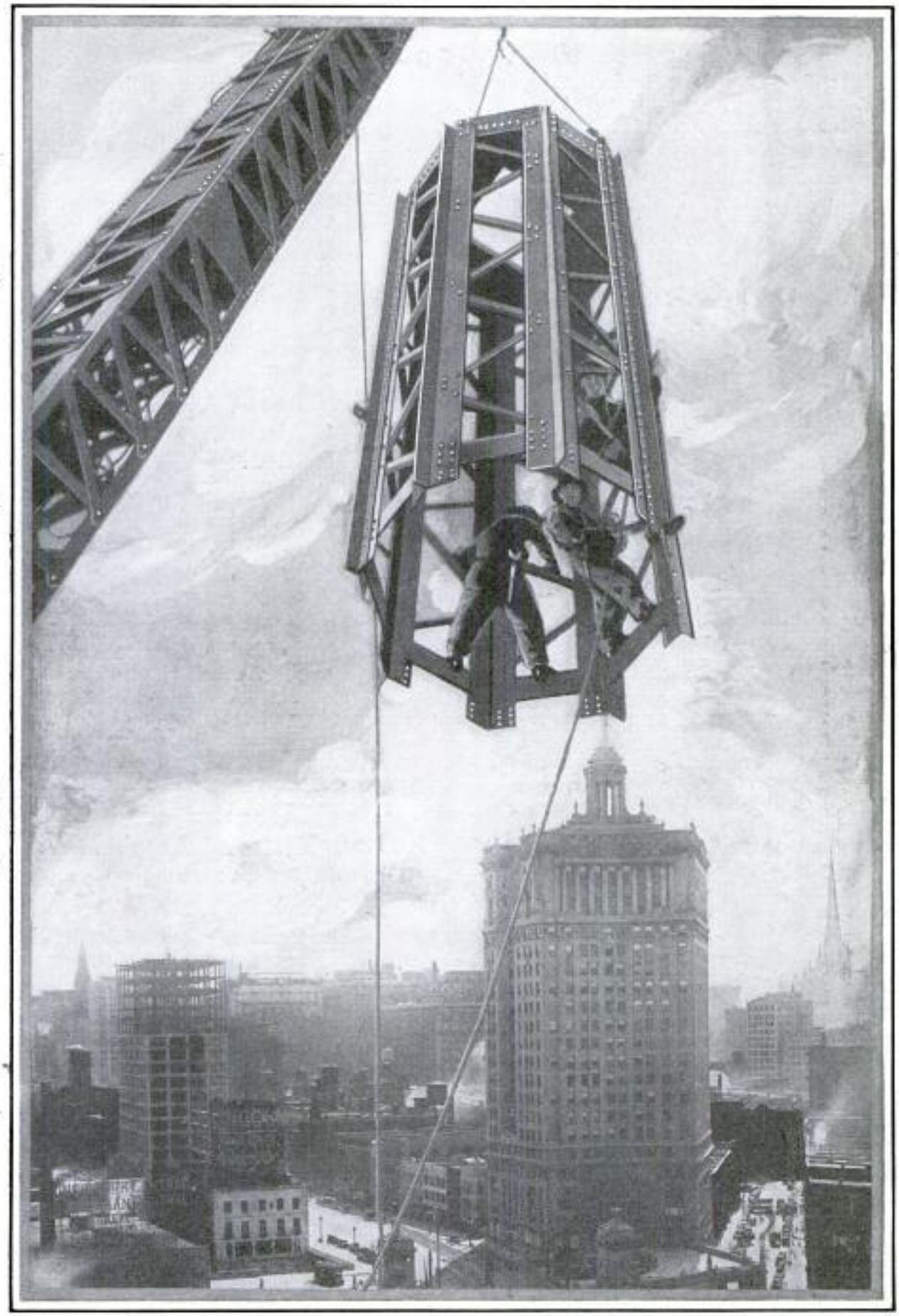


Five Hundred Feet in the Air Means Nothing to the "Connecters" of the Erecting Crew as They Ride a Huge Fabricated Column to Its Place

Copyrighted material

Rubber Roadway Laid on Bridge to Stop Wear and Skidding

Interlocking rubber blocks have been laid on a Chicago bridge to protect the wooden planks from wear and to stop automobiles from skidding. Those for the center vehicle lanes are an inch thick and those on the sidewalks, half an inch. They are securely nailed down to special planking which replaced the old wooden boards, and besides the interlocking, they are firmly imbedded in tar, poured between the edges to keep water from rotting the planks beneath and to hold the blocks from curling up.

Copyright, Underwood & Underwood

Workmen Paving Bridge with Interlocking Rubber Blocks Laid in Tar and Nailed to Special Wooden Flooring

Power of Sea Tides Being Harnessed to Yield Electric Current

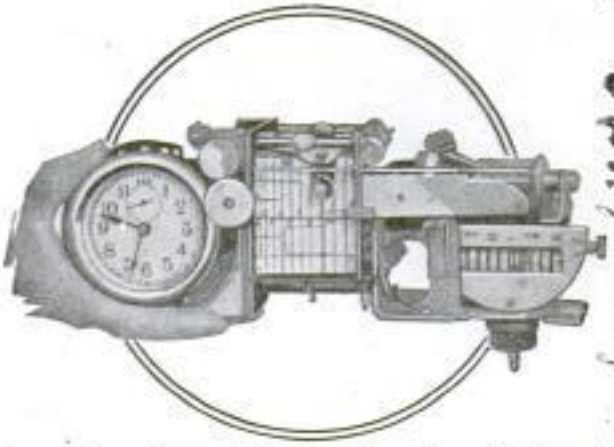
Dreams of engineers to harness the sea are approaching probable realization in the construction of the first big hydro-electric plant to be operated by the rise and fall of the tides at West Mersea, Essex, England. The unit is so arranged that at high water, a tidal basin is filled and drives turbines as the water flows out during low tides. This furnishes power and also pumps water into an upper basin for use at high tide so that the operation of the generators is practically continuous. The first section of the plant will produce over 4,000,000 kilowatt-hours of current a year and the completed works will have a capacity nearly four times as great.

Dual Ignition for Aircraft Engines to Safeguard Aviators

To guard the lives of aviators and simplify operation of airplanes, a safety code governing aircraft engines and equipment has been devised. The present type of internal-combustion engine was used as a basis for the recommendations. New types, it is provided, must pass a fifty-hour durability test before acceptance. The code requires that all aircraft engines of more than 100 horsepower shall have a dual ignition system. All controls are required to be made standard in the direction they move. The covering over the engine and the motor itself must be so arranged that parts liable to require attention may be reached easily when the plane is on the ground and without dismantling. Safety provisions are also made for gasoline, oil and water piping, tanks and radiators, and all receptacles of liquid must be so constructed that they can be drained when the plane is at the normal position on the ground.

Telltale Tracer of Auto's Moves Helps to Control Traffic

To aid in enforcing traffic laws, a western inventor has patented an attachment that gives both the auto driver and police a visible and accurate record of



Auto-Move Tracer Showing Recording Chart and Relation to Clock and Speedometer

Copyrighted material

practically every movement of the car. Variations in speed, stops, right and left turns and the exact hour and minute at which they occurred are charted. Should a dispute arise, the car's performance could be traced back for twenty-four hours and more, simply by consulting the instrument and its indisputable report. The recorder is only four inches wide and nine inches long. It consists of a clock that moves a series of rollers and spools on which is a chart divided vertically by hours and horizontally by miles, and a governor on the speedometer operates a recording point in contact with the chart. In a supplementary attachment, a needle records the direction of travel and right and left turns, while another indicator tells at what times the machine's lights were turned on or off.

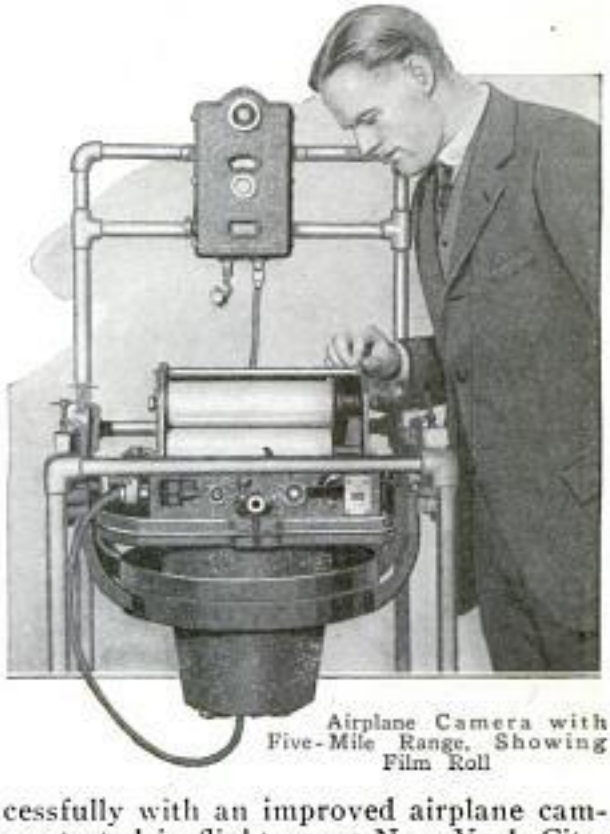
Painters' Cramp and Wrist Strain Avoided by Loop-Grip Brush

The handle of a paintbrush which can be gripped in the palm of the hand and used so no strain will result on the wrist or fingers of the worker has been patented. As the brush may be wielded with long strokes of the arm, the paint may be spread in an easy, free-flowing, natural manner. Thumb and fingers entwine readily around the grip so the hand is always straight with the arm, affording a gentle, untiring movement that permits a full sweep of the brush and which can be reversed in an equally smooth, steady stroke, either for vertical or horizontal work. Even if painters are long accustomed to the old-style brush, the loop grip is said to be readily adapted to the workman's stroke, reducing fatigue and increasing the amount of surface a man can cover in a given time. The variety of holds which can be employed with the handle are also claimed to reduce tiring of the muscles where fast work is required.

Much manual labor has been eliminated in Alabama coal mines by hydraulic mining.

"Aerial Eye" Camera Takes Views at Altitude of Five Miles

Clear photographs from an altitude of five miles are said to have been taken successfully with an improved airplane camera tested in flights over New York City. The instrument is operated automatically after being set for exposures, weighs forty-two pounds and is designed to aid army aviators in preparing maps. Fewer journeys will be necessary with this camera, as the increased range of the "aerial eye" enables the photographer to get in one exposure what would require several flights at lower altitudes.



Airplane Camera with Five-Mile Range, Showing Film Roll

Lead-Headed Nails Prevent Leaks and Rust in Metal Roofing

One of the weaknesses of metal roofs is that they sometimes rust and spring leaks near the nail holes because the galvanizing material was chipped away when the fasteners were driven through. To prevent this, a nail with a conical-shaped lead head has been devised. As it is driven in, the head flattens and finally conforms to the surface of the roof.

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Institute of Makers of Explosives, 103 Park Ave. New York, NY 2033

Dynamite Blows Out Oil-Well Fires When Steam and Water Fail

Exploding dynamite in the midst of raging flames to extinguish them sounds like an absurdity, but that is what is sometimes done in the oil fields when wells catch fire. Not long ago, a gasser in Colorado which had blazed steadily for twenty days, in spite of efforts to quell it with a battery of thirteen steam boilers and with pumps throwing water, mud and chemicals, was quickly extinguished with a charge of dynamite that literally blew out the flame and stopped the flow of gas. The action, in the case of an oil well is much the same as when the dynamite is fired in a quarry. Just as the explosion shatters the rock, when the charge is set off in the flaming torch of a gas well, it breaks the blaze into fragments and at the same time, a tremendous volume of rapidly expanding gas is liberated in the midst of the flames with velocity sufficient to snuff out the fire below, stop the flow of gas and blow the blazing material above so high and wide into the air that there is no flame left to ignite it when the gas starts to pour out of the well again. When dynamite was used several years ago to extinguish a spectacular oil-well fire in California, where the blaze shot up 300 feet in the air, it was reported that the explosive divided the blazing column into three sections. The middle section, at the level of the explosion, was blown away horizontally, the upper section upward, and the lower section was entirely extinguished.

Gasoline and Electric Locomotive Eliminates Noise and Smoke

Operated as a self-contained power plant, a gasoline-electric locomotive for switching has been tested in an eastern city. It is said to be practically noiseless, the sound being deadened by a muffler on top of the roof, and it makes no smoke, two features which recommend it strongly for city service. Greater safety is claimed as no trolley or third rail is needed, and cost of installation is also reduced. The engineer controls both the generator and motor, thus saving one man's hire.

Interior and Exterior Views as Gasoline-Electric Locomotive Was Prepared for Switching Test

General Electric Co Schenectady 244

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1701 Keystone View Co., Inc 91-7th Ave New York

At the End of the Day, Food Inspectors Gather at Headquarters to File Written Reports of Work Done

Guarding the Health of Millions

Ceaseless Vigil of Army of Unseen Workers Cuts Death Rate in War on Disease

KEEPING ceaseless vigil over the health of more than 28,000,000 persons in eighty-three of the largest cities of the United States, is the task of an unseen army of health-department employes. In these cities alone, a recent survey showed, there were 8,692 persons employed either full or part time as physicians, nurses or inspectors. Largely as a result of this work, the modern city, in spite of crowded conditions and other drawbacks, is one of the safest and most healthful spots for human life on the face of the globe. An up-to-date health department is organized somewhat along military lines with a commissioner, perhaps, as the commanding officer. Under him are assistants who have charge of such divisions of activities as communicable diseases, laboratories, child welfare and hospitals, or food inspection, vital-statistics bureaus, where births and deaths are reported, sanitation and sanitary engineering. Under these chiefs are hundreds of inspectors with their regularly allotted districts, making daily rounds of hotels, restaurants, bakeries, groceries, candy stores, markets, slaughter-houses, soda fountains and fruit stores to detect any violation of the

Smoke Inspectors Measuring Soot Found in Flues

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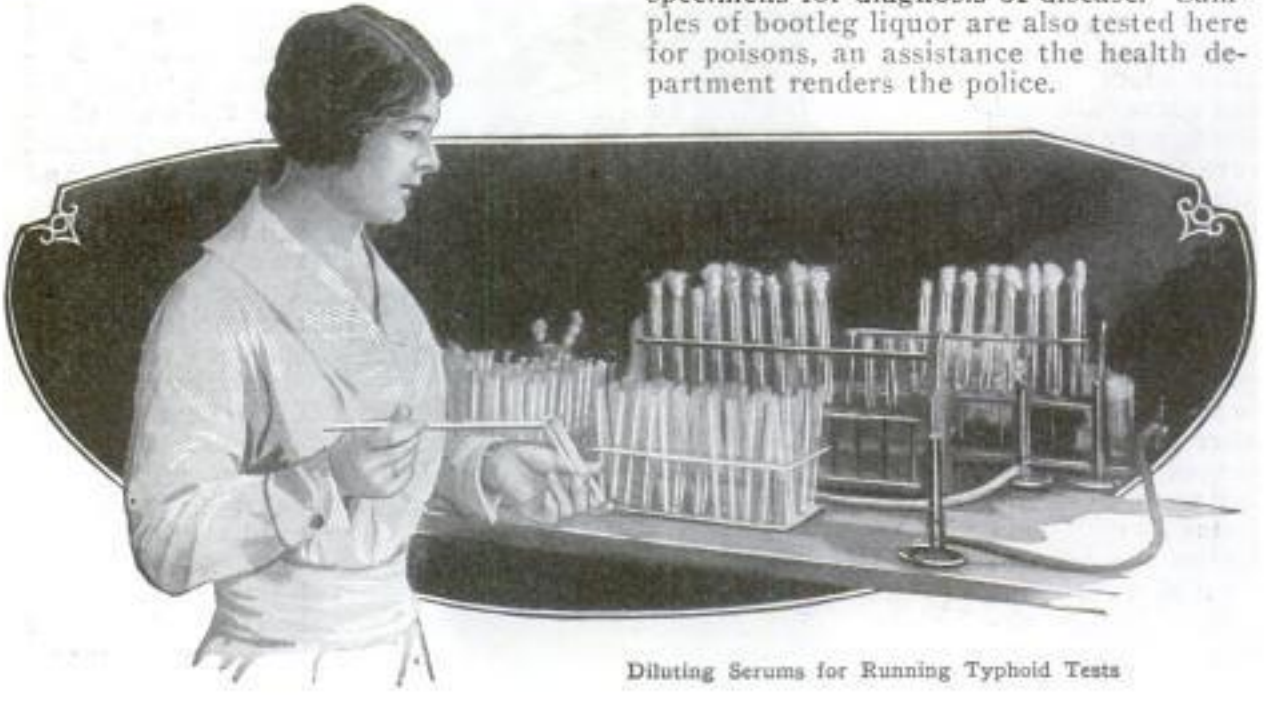
At the Restaurant Refrigerator, the Food Inspector Constantly Guards the Public by Careful and Regular Examinations of Meats

sanitary ordinances or impure foods. Visits of this kind last year resulted in the condemnation of over 8,000,000 pounds of fruit in New York alone. Daily reports are made in writing to headquarters after the inspectors have completed their rounds. In other districts, field and school health officers with supervisors in charge are on guard against sickness especially of the communicable variety among children. Private physicians co-operate with them in this, and in case epidemics do break out, flying squadrons of health officers are available for duty in any part of the city. As soon as a case of contagious disease is found, it is reported by telephone, a quarantine notice is posted on the premises, and a health officer is sent to trace the source of the disease if possible and recommend hospital care if needed. Closely allied with the medical division is a "signal service" branch of the department where charts are kept showing the normal trend for various diseases according to the season and also the number of cases reported. If the current line approaches the epidemic marks, also shown on the charts by reports from previous years, warning is issued to the health commissioner, conferences are held with the department heads and extra precautions are taken in the district where danger threatens. Flung far out beyond the city's limits is an advance line of dairy inspectors, to guard against contamination of the daily milk supply. Inspectors travel hundreds of miles from the cities, visiting farms and milk depots, taking sediment tests by pouring a small quantity of milk through a round piece of cloth which is kept for record and mailed to headquarters regularly. In other divisions of a big health-department laboratory, hundreds of tests are made daily on cultures and blood specimens for diagnosis of disease. Samples of bootleg liquor are also tested here for poisons, an assistance the health department renders the police.



Diluting Serums for Running Typhoid Tests

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Measuring Acids Produced by Germs with Electric Apparatus, and at Left, Testing Telephone Mouthpiece in Hunt for Microbes

Keeping Vigilant Watch of the Cleanliness of Public Bathing Places, Suits and Equipment, and Preventing Contamination of the Milk Supply by Daily Inspections at Dairies and in the Cars, Are Important Duties of the Health Guardians of the People

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Cincinnati Times Star 9/30/24

Acrobat's Stunts on Stilts Show His Skill in Balancing

1812

Stilt walking, a favorite pastime of boys, has been developed into a feat requiring considerable skill and daring by a German acrobat. He uses no side supports for his hands or shoulders, balancing himself with the aid of strong straps attached to his shoes, on top of the sticks which are more than seven feet long. Imitation boots at the bottom of the stilts and costumes aid the performer in grotesque characterizations. To mount the elongated appendages, he uses a special ladder and platform, or sometimes steps directly upon them from a second-story window.

Skilled German Stilt Walker in Two of His Odd Make-Ups and How He Walks over Motorcycles

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¶It costs an average of 10.27 cents a mile to operate an automobile in Iowa, according to reports of the Iowa state college. The estimate includes depreciation, interest, maintenance and driving expense, and assumes that a car will last six years and can be driven for at least 36,000 miles.

World's Greatest Warship for U. S. Combines Speed and Power

1947

With the completion of the new naval aircraft carrier "Lexington," the American navy will have what is said to be the world's greatest warship. With a length of approximately 900 feet, a beam of 106 feet and a speed of thirty-five knots, the ship outranks England's greatest battle cruiser, the "Hood," and likewise the new British aircraft carrier, the "Hermes." Like the latter, the craft will be something of a freak in appearance, with all her funnels, bridge and other superstructures mounted on the port side, to leave a clear launching deck for airplanes. This deck will have two acres of space, and the hull construction is such that it would be practically impossible for a shell, aerial bomb or torpedo to sink the ship. To develop the enormous speed of thirty-five knots the "Lexington" is equipped with four propellers, each driven by two electric motors with power from four turbogenerators capable of developing 180,000 horsepower. Five elevators are being installed, and the ship will require a crew of 178 officers and 1,498 men. The vessel will have a complete photographic laboratory, an aerological staff to forecast the weather; a wing covering and fuselage shop; optical repair shop, instrument shop and a pigeon loft. About seventy-five miles of cable will be used to operate the ship's communication systems. These include 325 telephones, 120 electric clocks; many electric whistles, telegraph and indicator systems for operation of the ship; 500 call bells; fire alarms; a gas-alarm system of 250 electric howlers; gyrocompass system with twelve repeaters and the fire-control system. With her great speed the "Lexington" will be able to maneuver out of range of any war vessel now afloat and protect herself while her airplanes attack the enemy, in the opinion of naval experts.

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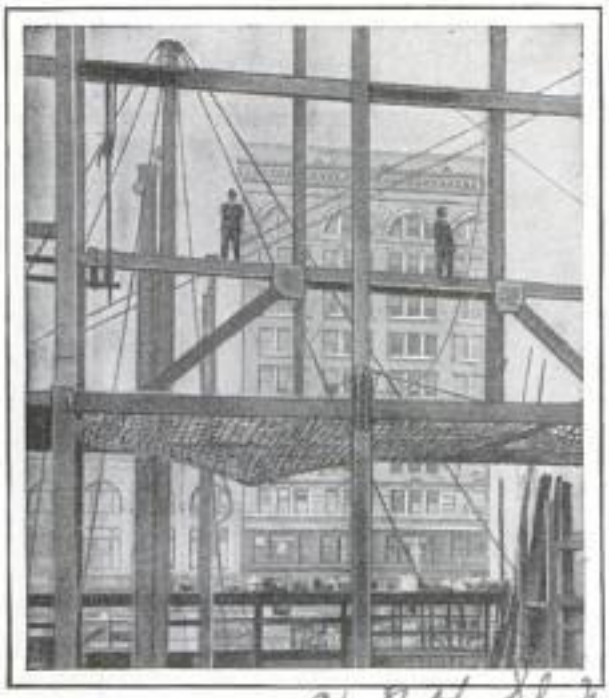
Train Police by Movie to Shoot to Cripple, Not Kill

With the aid of motion-picture targets, New York policemen are being taught how to halt fleeing criminals by crippling rather than killing them. The apparatus consists of a projector which throws figures of moving men, automobiles and other marks upon a screen and is so arranged that the instant a shot is fired, the picture stops, revealing the spot where the bullet struck. After the hits or misses have been disclosed, the film continues.

Life Net for Skyscraper Workers Protects Them from Falls

While the everyday feats performed by structural steel workers, balancing themselves at perilous heights on slender beams are scarcely less thrilling than those of the flying trapeze artists of the circus, they usually scorn any thought of risk and only simple protective measures are taken to safeguard them should they fall. However, a western contracting firm engaged in erecting a skyscraper in San Francisco, took no chances when it was found that ordinary planking could not be used across wide spaces in the rising building. Rather than leave the perilous gap exposed, a net was woven from rope and stretched between the uprights and crosspieces to catch anyone who might fall.



Copyright, Keystone View Co.
Rope Net Stretched between Beams of Skyscraper as Protection against Accidents to Steel Workers

Siphoning Gasoline from One Tank to Another with Suction Bulb and Filter Hose

Rubber Suction Bulb Aids Autoists in Getting Water or "Gas"

A suction bulb, equipped with enough rubber tubing to transfer gasoline from the tank of one car to that of another, is offered as one of the latest motor accessories. The device makes it possible to borrow or buy enough gasoline from a passing motorist to reach the next filling station and will save long walks or the extra expense of having a garage car deliver the supply. The bulb and tubing form one unit of a combination siphon, filter, strainer and bottling funnel. The complete outfit has an intake float with a self-contained filter sponge, and a funnel cup with bottom valve and removable charcoal and felt filter. The suction bulb is used to start the liquid, and thereafter it is automatically siphoned down from the container.

Upside-Down Rainstorms Given as Cause of Lightning

From tethered balloons during summer thundershowers, scientists have observed the phenomenon of topsy-turvy rainstorms, spray hurled upward from the clouds by ascending blasts of air. In this movement the raindrops act as carriers of electricity and, according to a U. S. weather bureau expert, are responsible for the accumulations of positive and negative charges that produce lightning.

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Books Over Two Hundred Years Old Are Still Used by Monks

The ancient mission at San Luis del Rey, Calif., boasts some of the rarest ecclesiastical books in America. They were made

Mission Monk beside Rare Old Volumes Used by Priests Two Centuries Ago

in 1670, more than a century before the first settlement in the state, and were brought to America by the Spanish priests. The books, five in number, were made by hand, every letter being painted in black and red by the monks in European monasteries. The leaves are parchment beaten from sheepskin, and the covers are of rawhide or wood, brass-bound and studded with rivets. The largest volume is thirty by thirty-six inches.

Brushes Rotate around Armature in New Transformer-Converter

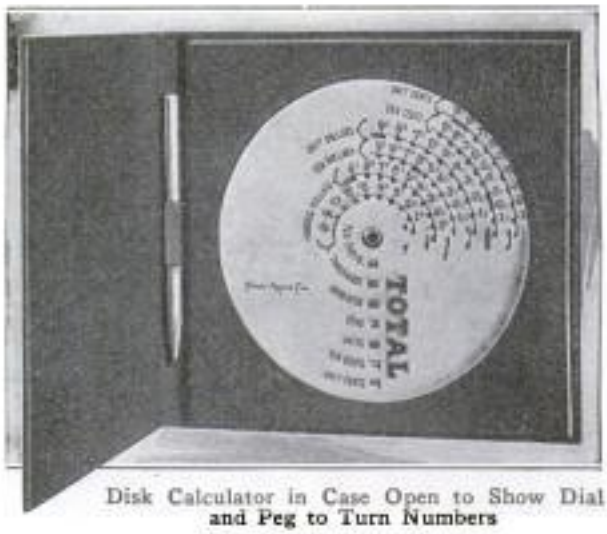
Greatly improved methods of transmission of electrical power are expected to result from a novel electrical machine that changes low pressure alternating current into high pressure direct current. It performs substantially the combined functions of a transformer and a rotary converter. Only the brushes in the device rotate. One machine shown at the Wembley exhibition, England, was of 2,000-kilowatt output, delivering twenty amperes of direct current at 100,000 volts. A sister machine took the direct current from a transmission line and transformed it to low-voltage alternating current for industrial motors and lights. Direct current at high voltage is known to be the best for transmission purposes, but it has not been practical to make generators for more than 6,000 or 10,000 volts.

Greater Wear on Right-Hand Tires Blamed on Slope of Road

Popular belief that turning many corners to the right causes tires on that side of the car to wear out first, is wrong, according to the manufacturers. They attribute it to the pitch or curve of the road surface, which naturally throws a heavier load to the right and therefore causes more friction on the tires on that side. Changing them all around once a month is recommended to obtain uniform service.

Pocket-Size Disk Calculator Saves Much Time in Figuring

For making arithmetical calculations quickly and accurately, a pocket-size computing device which adds, subtracts, and multiplies by rotating numbered cardboard disks in slots on a dial, has been made. Totals are shown in a separate column at the side. The card is specially useful to engineers, lumbermen, and others whose work requires numerous calculations. Styles are made for handling fractions and for keeping bridge and whist



Disk Calculator in Case Open to Show Dial and Peg to Turn Numbers

scores. The device comes in a durable case that lies flat on the table and may be carried in the pocket. A wooden peg is provided for turning the disks. The calculator is simple to operate, has no mechanism to get out of order and takes up no more room than a thin book.

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1847 Bausch & Lomb Optical Co Rochester, NY

Examining Rough Blanks of Glass Before They Are Sent to the Molders Where Heat and Pressure Reduce the Crystal Blocks to the Shapes of Finished Lenses

Turning Glass into Powerful Lenses

Once an Art Shrouded in Mystery, Making of Raw Optical Glass Is Now Part of American Industry

UNTIL recently regarded as an industry almost solely confined to countries of the Old World, the making of glass for powerful lenses is now a process numbered among the achievements of American skill. Spurred by inability to procure lens glass in the rough and partly finished states from foreign sources during the war, manufacturers established laboratories and factories to turn out high-grade materials to meet a rapidly growing demand for optical aids. And although consumption of the products has increased greatly in the past decade, the volume of importations has grown but slightly over the $750,000 worth of blank and roughly trimmed lenses formerly brought into this country each year.

The first operation in the making of lens glass is the construction of the semiporcelain pot in which the raw ingredients are melted and fused under the intense heat of the furnace. The clay used is entirely free from any mineral particles or other matter that could affect the quality of the finished article, for the slightest flaw renders the glass unfit for its purposes. After it is mixed the plaster is kept in a damp state for about two months to season, and every day it is moistened and put through a mixing machine several times to insure thorough blending and smooth surfaces when the pots are molded. After drying in storage for three months, the containers are subjected to heat equal to that of the furnace for five days, when they are ready for work.

During the melting process in the heart of the white-hot oven the liquid mass in the pot is kept constantly agitated by stirring rods of clay, rotated automatically. Should the stirring be too slow or too rapid, the siruplike liquid will fail to mix properly or take in air bubbles which remain after it has been rolled into thin sheets. Eight to twenty hours of firing are necessary to bring the glass to a condition of stiffness, during which time samples are taken with a long-handled ladle. Temperatures are tested by thrusting a small bulb resembling an incandescent light into the furnace through an aperture in the door. The instrument varies in color as the heat surrounding it increases, and by matching these shades with those of the boiling glass, the condition of the mass can be determined.

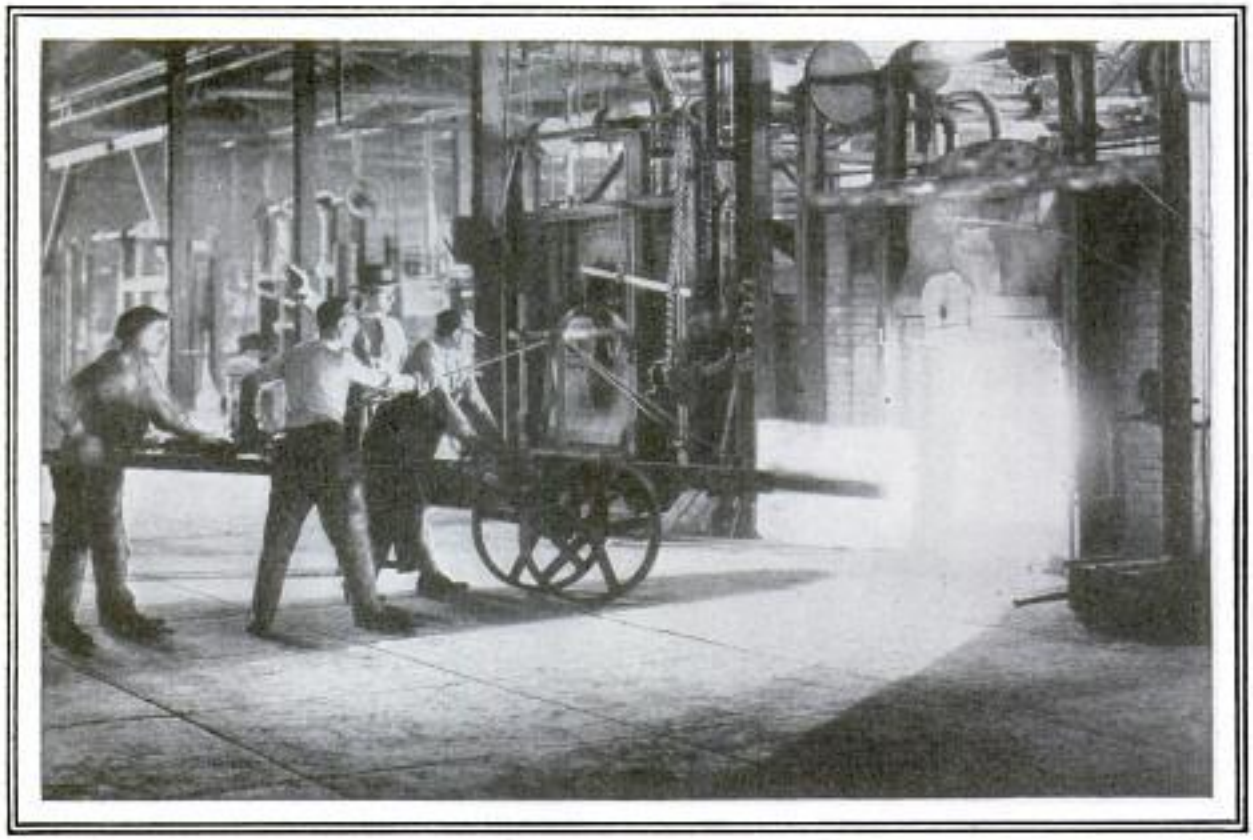
When ready for rolling, the clay pot of

Copyrighted material

glowing liquid is lifted from its fiery bed and poured onto a table where a heavy steel cylinder flattens the glass into a broad sheet. At a certain point in the cooling of this sheet, it is pushed into an annealing oven from where it emerges to be cut into small pieces for inspection. This is accomplished by passing beams of brilliant light through the crystal edgewise to reveal any specks, bubbles, clouds, or strains left by the working table and roller. With proper allowance for grinding, the glass is cut into pieces of the general shape of finished lenses, sizes being governed by the dimensions, power and thickness the completed articles are to have. Tested on scales and examined for perfection, the blocks are then sent to a pressing room where they are reheated and molded into blanks ready for the grinders, which they reach after a final annealing to remove any defects overlooked by previous inspections. Following the grinding and polishing processes, which are done under close supervision, the lenses are measured for accuracy of workmanship on focusing and centering machines. For cylindrical ones, a lined target before which they are held, guides the operator for the placing of dots on the glass to indicate the exact points for the determination of accuracy, but spherical-surfaced lenses are tested in front of a tube and when their centers are in line with the "sight," a lever controlled by the inspector causes a single dot to be imprinted on the surface.

Although extreme care is exercised in the manufacture of raw glass for optical lenses, the great power of the disks is the result of skill in grinding, as the slightest deviation from a specified measurement is sufficient to render the glass worthless. For cameras, astronomical instruments, microscopic implements and similar articles various grades of mixtures are employed to produce the required properties in the glass. These are always tried out in the rough state before being permitted to pass through the pressing and grinding operations.

Besides glass for ordinary optical uses, sights are made in the lens foundries for rifles, range finders, and the delicate scientific instruments with which almost every laboratory is equipped. And spectacle glasses are manufactured for almost half of the great army of workers engaged in the industries of this country according to figures of the National Committee for elimination of waste, which put the number of persons with defective eyesight at close to 25,000,000, although all of these do not resort to the aid of glasses.



Plucking the White-Hot Pot of Molten Glass from the Depths of the Roaring Furnace Where Raw Materials for Lenses Are Fused in a Volcano of Intense Heat

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Checking Lenses for Accurate Centering, and Right, "Blocking" the Glass Blanks for the Surface-Grinding Machines

Mixing Room Where Materials for Glass Are Combined, a Process Requiring Extreme Skill and Great Care in Blending Proper Proportions of Ingredients; Left, Inspecting Spherical Lenses with Apparatus Which Marks the Center with Small Dot so Any Incorrection of Grinding May Be Easily Detected

Courtesy of Bausch & Lomb Opt. Co.

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Washington Pastry Co. San Francisco, Calif New York Times 10/13/24

Bridal Party and Church Modeled in Pastry for Wedding Cake

1920

To add festivity to a wedding in a western city, caterers displayed their skill in preparing a large cake modeled closely after a church. The bridal party was likewise represented in pastry and sugar, the entire piece weighing fifty pounds.

Copyright, Keystone View Co.

Sparkling and Gaily Colored Pastry Church with Realistic Bridal Party Modeled by Skillful Chefs for Wedding Feast

Gasoline Is Produced from Plants to Be Grown on "Oil Farm"

1964

Following his announcement that he has successfully produced gasoline for automobiles from various kinds of plants, a French scientist has proposed that a tract of 500,000 acres of land in western Africa be devoted to the cultivation of this vegetation for the production of 90,000,000 gallons of petroleum annually. His process is based on the fact that artificial petroleum can be manufactured from certain so-called "ether salts," and these are found in a broom plant and in other fibrous and textile vegetation. Gasoline is next obtained in the ordinary manner, which, the professor asserts, is "exactly like that produced in Pennsylvania and equally good for use in motors." Utilization of the fibrous by-products of the vegetation on the proposed "oil farm" in the silk industry and in paper mills, is feasible, he claims, and will afford an additional source of revenue.

Chicago Tribune 10/6/24

Phone Lines Are Damaged by Bears While Hunting for Honey

2008

Bears that mistake the humming of the wires for the sound of bees and climb telephone poles in search of honey, squirrels that eat lead cables, woodpeckers that destroy uprights and crossbars with their vigorous bills are some of the forest and mountain enemies of the telephone companies. They cause linemen constant trouble, increase the maintenance bills and may throw the wires out of commission at times when urgent messages are being sent and lives are at stake. The bear does its chief damage by smashing the glass insulators, causing short circuits. The gray squirrel is said to be the principal offender of its kind, the hole that its teeth leave in the cable offering a resting place for moisture that may temporarily dislocate the service. White-headed woodpeckers are active, especially in the state of Washington, where they attack the soft cedar poles. Eagles may cause short circuits when they flap their wings against the wires after resting on one, while wasps, beetles and field mice also impair the service.

Auto Air Springs Absorb Shocks with Inflated Rubber Balls

1741

Shock-absorbing air springs for automobiles, the invention of a famous pianist, have been patented. A plunger operates against an inflated rubber ball covered with canvas and inclosed in a nickeled steel sphere with an air valve on top. The ball is usually blown up to a pressure of thirty to forty-five pounds and, it is claimed, will last 20,000 miles. The arrangement is said to afford great buoyancy and ease in riding and has been applied also to hospital beds, ambulances and airplanes.

Inv. Prof Maithe Paris, France

Stevens Mfg Co., Lowell, Mass

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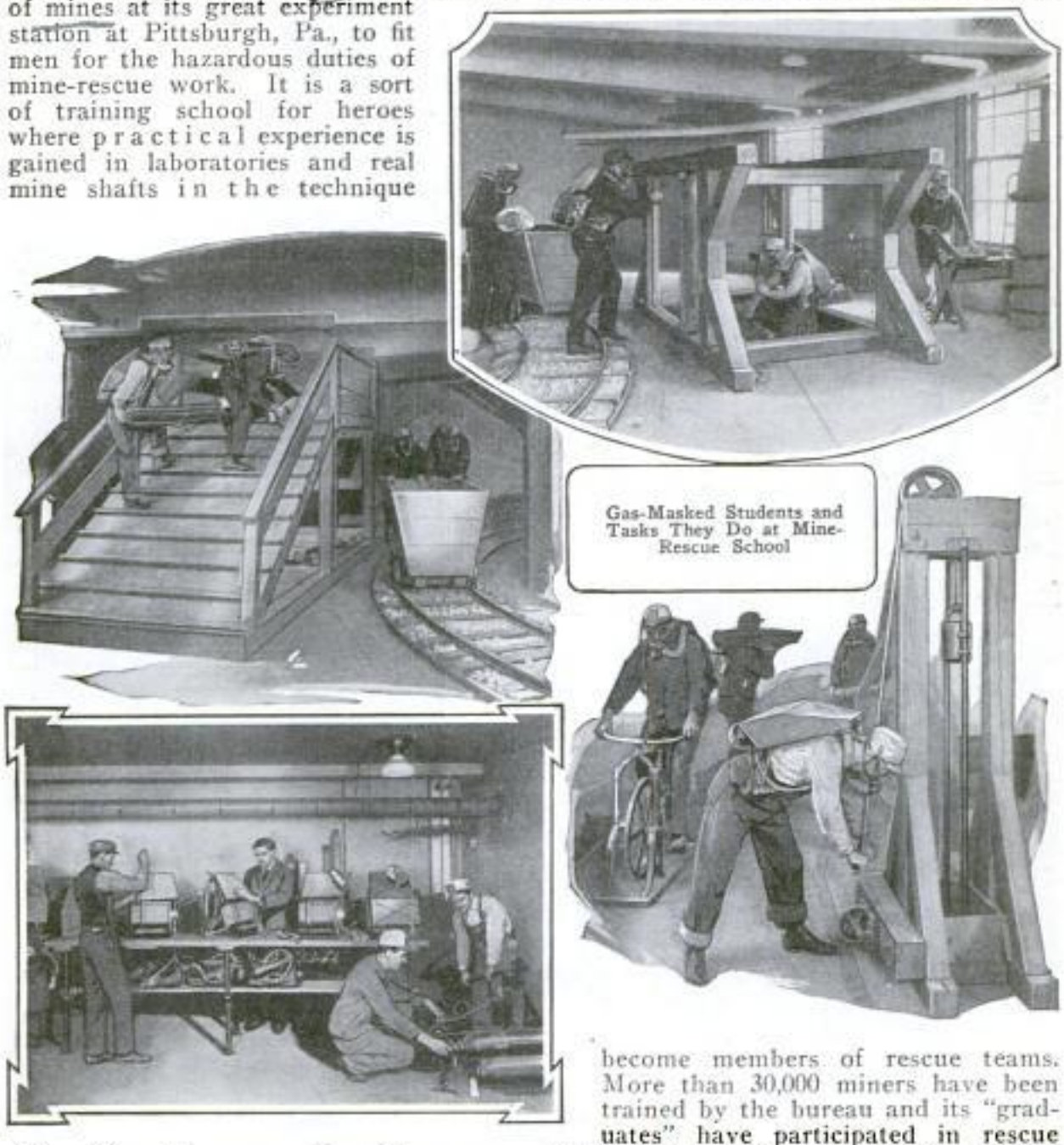
School for Heroes Teaches Science of Rescuing Men from Mines

One of the oddest schools in the country is maintained by the federal bureau of mines at its great experiment station at Pittsburgh, Pa., to fit men for the hazardous duties of mine-rescue work. It is a sort of training school for heroes where practical experience is gained in laboratories and real mine shafts in the technique of handling the oxygen-breathing apparatus, in detecting the presence of poisonous gases and in fighting fires. Candidates must be between twenty-one and forty-five years old and physically fit to undertake the instruction courses. They are put through strenuous exercises, while wearing their oxygen outfit, in fume-filled atmospheres, sometimes toiling at hard physical labor for two hours at a time, setting up timbers, pushing mine cars, laying pipe lines, shoveling rock and carrying out dummies that represent injured or dead miners, from the depths of the mine to the fresh air above. When they have successfully passed examinations in the tests, they are given certificates attesting to the fact that they are competent to become members of rescue teams. More than 30,000 miners have been trained by the bureau and its "graduates" have participated in rescue work at nearly 200 mine disasters. Similar training is given by several state mining departments and by operators.



Gas-Masked Students and Tasks They Do at Mine-Rescue School

Artificial Teeth Made of Steel

Teeth made from enameled steel have been added to the products of the Krupp plants at Essen. The metal is from the same mixture formerly used in making German cannon. Eight dentists have been employed in the department at the start, and Krupps hope to expand it later.

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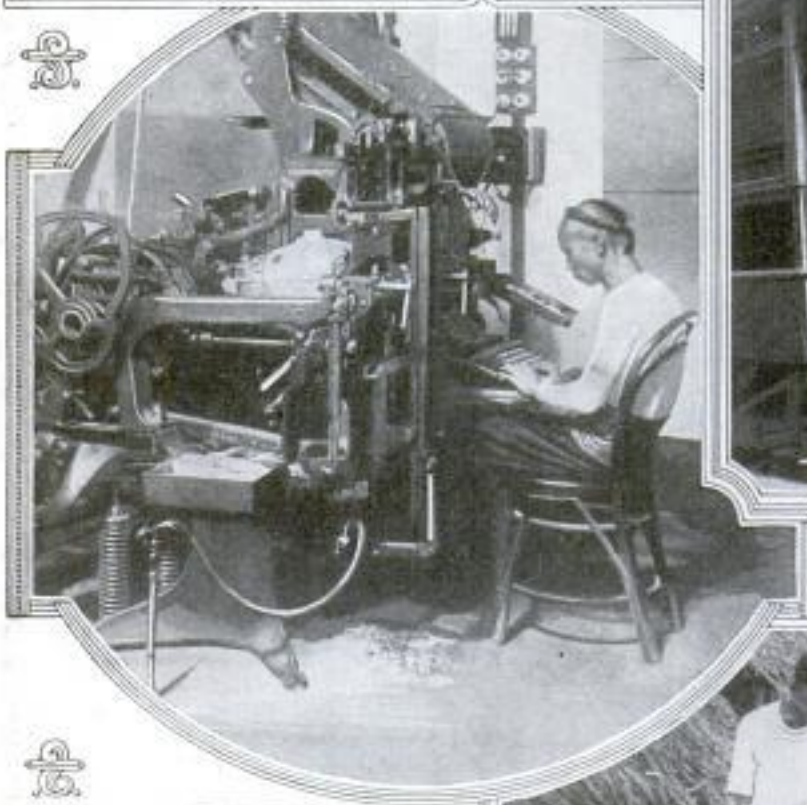
1874

American Machines in Foreign Lands

Telephone Exchange in Canton, China; These Girls Are Trained in Systems Prevalent in America; Below, Street Car Familiar on Many Thoroughfares of Orient, Where Electricity Has Helped to Free Workers from Customs of Their Ancestors



Setting Type for a Newspaper in China with an American Machine Composing Native Characters

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Right, Village Tailor in Darkest Africa Where the Modern Sewing Machine Serves to Introduce Western Methods to Semi-Barbaric Peoples Far Inland

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Steamer to Break Down Ice Fields with Weight of Its Hull

Shaped somewhat like a shallow river punt, a powerful steamer with a stem that will slide up on the edge of ice fields until the weight of the hull breaks down the barrier, is being built for keeping the port of Riga, Latvia, clear during the winter. If the bulk of the vessel proves insufficient for the task, about 150 tons of water can be pumped from special tanks in the stern to increase the weight of the bow. The action is intended to be aided by a forward propeller which will draw water below the ice away, leaving the barrier unsupported and more easily broken. In addition, the vessel has side tanks and by alternately filling and emptying these can "rock" itself free if caught in the ice. It is 185 feet long, 54 feet wide and has a displacement of 2,750 tons. There are heavily protected propellers on both ends, run by 4,000 and 1,500-horsepower steam engines. For protection against damage by the ice, stem and sternpost are of cast steel, and there is a metal ice belt around the hull extending six feet above and six feet below the waterline. In clear water the ship will have a speed of about fourteen knots.

Push-Button Map Tells Tourists How to Find Places in City

Located at a busy downtown corner in Los Angeles is a push-button electric map

As Tourist Pushes the Button, Electric Lights Flash on the Map between the Panels to Indicate Desired Destination

for assisting tourists in finding their way about the city. On either side of the map are column directories bearing the names of important buildings, companies, theaters and other points commonly visited. Opposite each name is a button. When this is pressed, tiny electric lights flash on the map at the point where the desired spot is located and also indicate the route to be taken in reaching it. Brilliant lamps illuminate the guide at night and the entire assembly is attractively arranged within a handsome frame.

Cigaret and Match Case in One

Holding both cigarets and matches, an attractive leather case has been made which prevents either from being misplaced. The holder also stops bits of the tobacco from falling into the pocket. A flap that buttons over the container aids in forming a neat parcel, and can be quickly unfastened. The case is made of fine leather.

Safety Seen in Splinterless Glass Made by Chemical Process

Closely resembling ordinary glass and suitable to take its place for many purposes, a chemical substitute that is said not to splinter has been produced in Germany. Because of this quality, it is being recommended for panes of motor cars and in optical instruments.

Moving Sign for Office Door Serves as Advertising Billboard

Fitting across the office door, a neat and attractive moving sign utilizes conspicuous space, that is seldom employed for anything but the firm name, to announce new goods or for other purposes. It is said to be simple to install, legible at a considerable distance and effective in catching the eyes of passers-by. It is designed especially for firms with inside shops or for use in connection with outdoor signboard or newspaper advertising campaigns.

Office Door Converted into Advertising Billboard by Moving Sign Attached across Upper Panel

Radio Call Letters Are Result of Unit Control System

Although the radio broadcasting-station calls may appear to be haphazard combinations of letters, in reality, they are carefully apportioned and controlled by a body that represents most civilized nations. In this country, they are assigned by the department of commerce, but back of it is the International Telegraphic union at Berne, Switzerland, which keeps all the records and formulates the regulations governing the call letters issued. This union is a result of the International Radiotelegraphic conference held in London in 1912, which was attended by representatives of forty-six countries. On Aug. 1, 1914, a series of call letters was allotted to all the nations that participated in the conference. By this agreement, all combinations beginning with N and W as well as the call letters from KDA to KZZ were assigned to the United States. Of these, the "N" series are reserved for the navy, and the calls from WUW to WVZ and WXA to WZZ for the army. With the addition of a fourth letter, which was made optional with the governments in the agreement, the United States has about 30,000 possible call-letter combinations which may be assigned to non-governmental stations. So far as possible the department of commerce has given calls beginning with the letter "W" to stations in the eastern part of the country and calls beginning with "K" to broadcasters west of the Mississippi. Amateur and experimental stations are given calls that do not conflict with the international system. In Washington a set of charts is kept which shows at a glance all call letters in use and to whom assigned.

Folding Piano Makes Playing Easy for Amateur Musicians

Built especially for persons with little or no knowledge of music, a portable piano has been made in England that is only three feet long and seven and one-half inches wide when folded up. There are fourteen keys on the top which play the air and nineteen on the sides to give the harmonizing chords. The instrument can be made to sell for forty dollars.

Portable Piano Which Is Only Three Feet Long When Folded, and Its Inventor

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1640 Stunt Wide World Photos 229 W. 43rd St New York City

Death-Defying Feats Built on Skill and Training

TO be whisked from the seat of an automobile racing along at sixty miles an hour and dangled at the end of a rope ladder hanging from an airplane swooping skyward, is a stunt only hard practice and steel nerves can accomplish for the agile daredevil who thrills gasping audiences. While love of hazard and adventure in most cases is responsible for the adoption of the risky careers by such performers, the attraction of high pay and its promise of early retirement are responsible for many recruits to the ranks of those who stake their lives against danger in the staging of thrillers. Nothing is attempted without preliminary preparation and drill. Though Miss Lillian Boyer walked across the wings of an airplane on her first trip aloft in a machine and made a successful transfer from one plane to another during her fifth journey up, it was not until after six months of hard physical drill and rehearsals to harden muscles and learn judgment that performances were attempted in exhibitions. Gladys Roy, who made a parachute jump from an altitude of more than 16,000 feet, had to be clothed like an Eskimo to prevent freezing during her perilous descent from the airplane which carried her to the

Leaping the Gap on a Bicycle Wrapped in a Cloud of Dense Smoke

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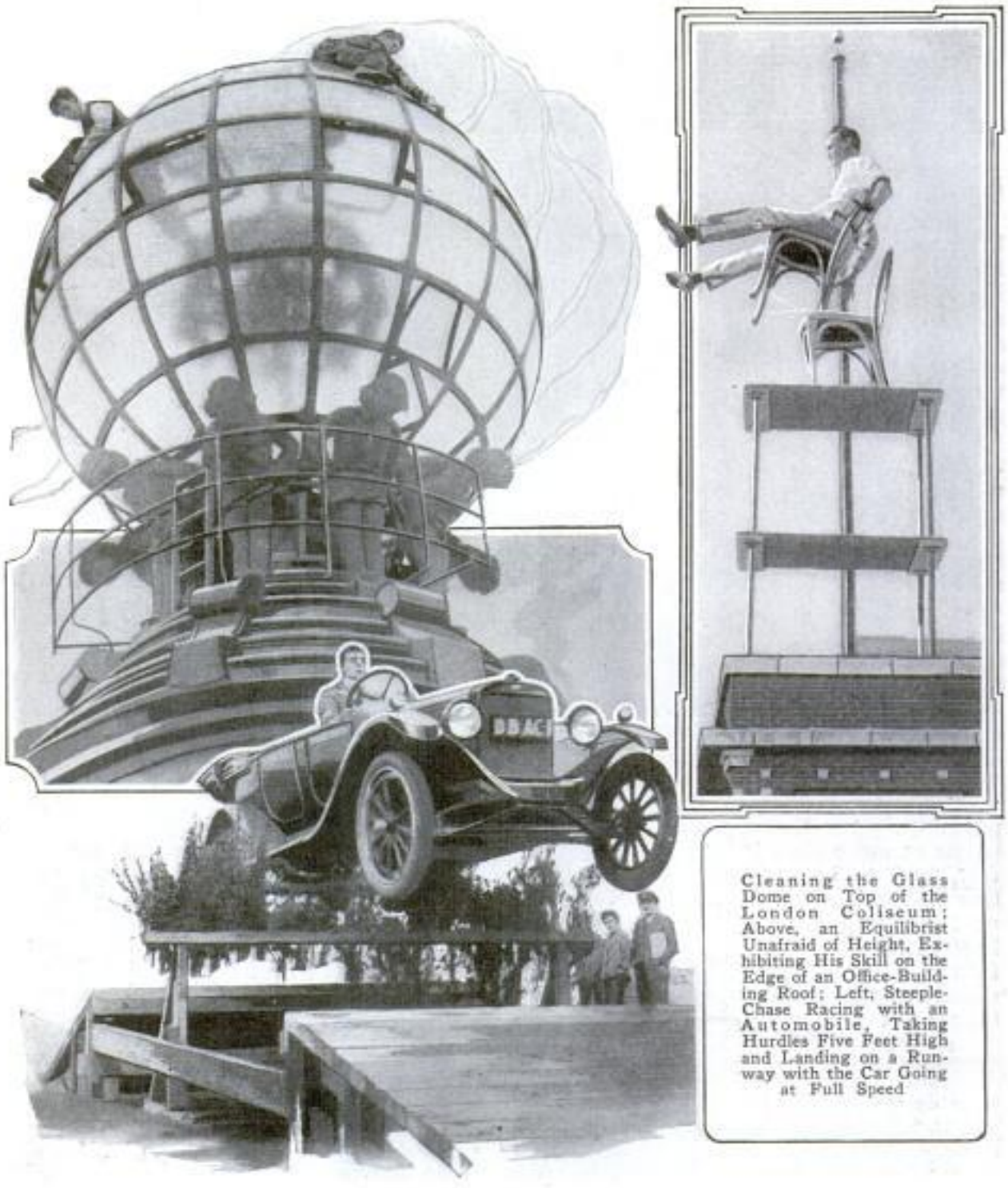

Cleaning the Glass Dome on Top of the London Coliseum; Above, an Equilibrist Unafraid of Height, Exhibiting His Skill on the Edge of an Office-Building Roof; Left, Steeple-Chase Racing with an Automobile, Taking Hurdles Five Feet High and Landing on a Runway with the Car Going at Full Speed

height. The intrepid Locklear, though killed in one of his hair-raising feats, never attempted a stunt which he had not carefully figured out beforehand. In discussing his act he disclaimed the term of daredevil, and would sketch his latest thriller on paper to show that he had worked it all out mathematically to make it perfectly easy. The biggest thing to master, he said, was the element of fear, and then add to that careful consideration of all the factors in the stunt. These combined with supreme confidence, he claimed, would enable almost anyone to perform what most people believe to be rare deeds. And although this daring flyer coupled brains with brawn, it was due to miscalculation while performing in the glare of powerful searchlights that he crashed to his death. While many daredevils acquire their training in a haphazard fashion, rarely risked by those whose close attention to every detail enables them to achieve amazing feats, most beginners are subjected to tests for endurance and lack of fear. Running, jumping, bar and

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Daring Guide Poised on Brink of 3,000-Foot Fall Getting Upside-Down View of Mount Rainier; Insert, Transferring from Speeding Motorboat to Airplane by Rope Ladder

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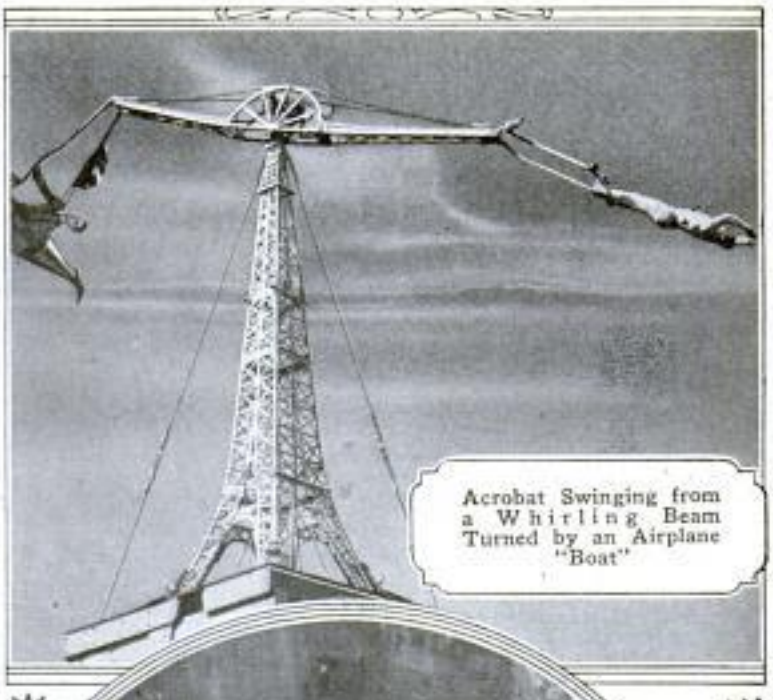
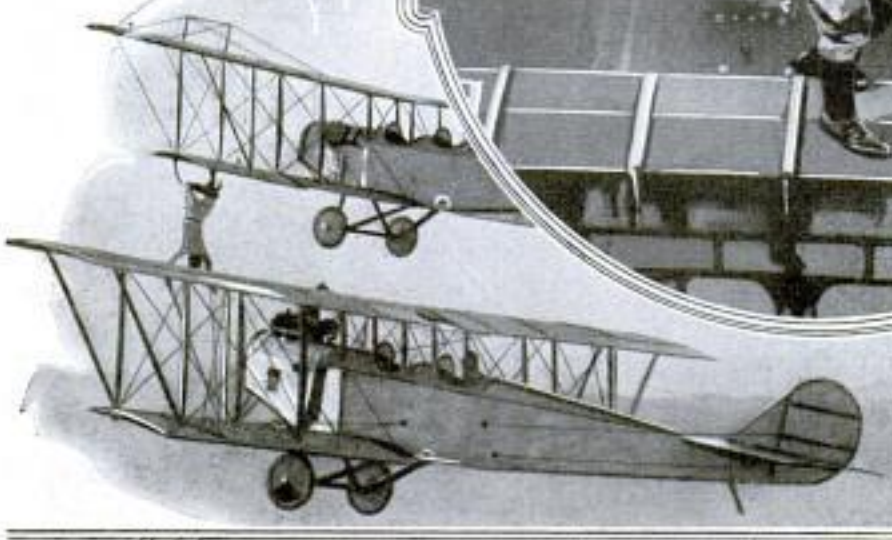
Human Flies in Their Precarious Climbs Are Always Attended by Gasping Throngs in Streets Below



Acrobat Swinging from a Whirling Beam Turned by an Airplane "Boat"



"Double-Deck" Stroll on Building Ledge Thirty-Five Stories above New York; Left, Changing Airplanes Head First

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trapeze drills form the daily routine under experienced instructors who seek to teach judgment and mental agility which serves the performer in case of accident or misstep. Gymnastics on the airplane while it is at rest are first perfected, then the student is permitted to go up for short rehearsals to acquire the feel of the wind and to get poise in maintaining balance while the ship banks and dives.

Comparatively few of the schooled thrillers meet with serious mishaps, though each season results in a toll taken from the ranks of those who attempt startling tricks without some previous training or practice. By devoting part of off time to a daily dozen, muscles and joints are kept limbered up for the leaps and vaults where careful gauging is required to span safely some precarious space. Long periods of idleness must be followed by a course in gymnastics before work of an acrobatic nature can be again taken up with success. Though fear is practically absent among them, when a thriller for any reason does become shaky, work is suspended for a time or given up altogether until the performer can regain nerve.

Automobile-racing drivers have been known to force their cars over dangerous roads at the speed of the wind with rag-

Catching a Bad Man for Movie Thrillers Calls for Death-Defying Risks; the Cameraman Rides an Auto

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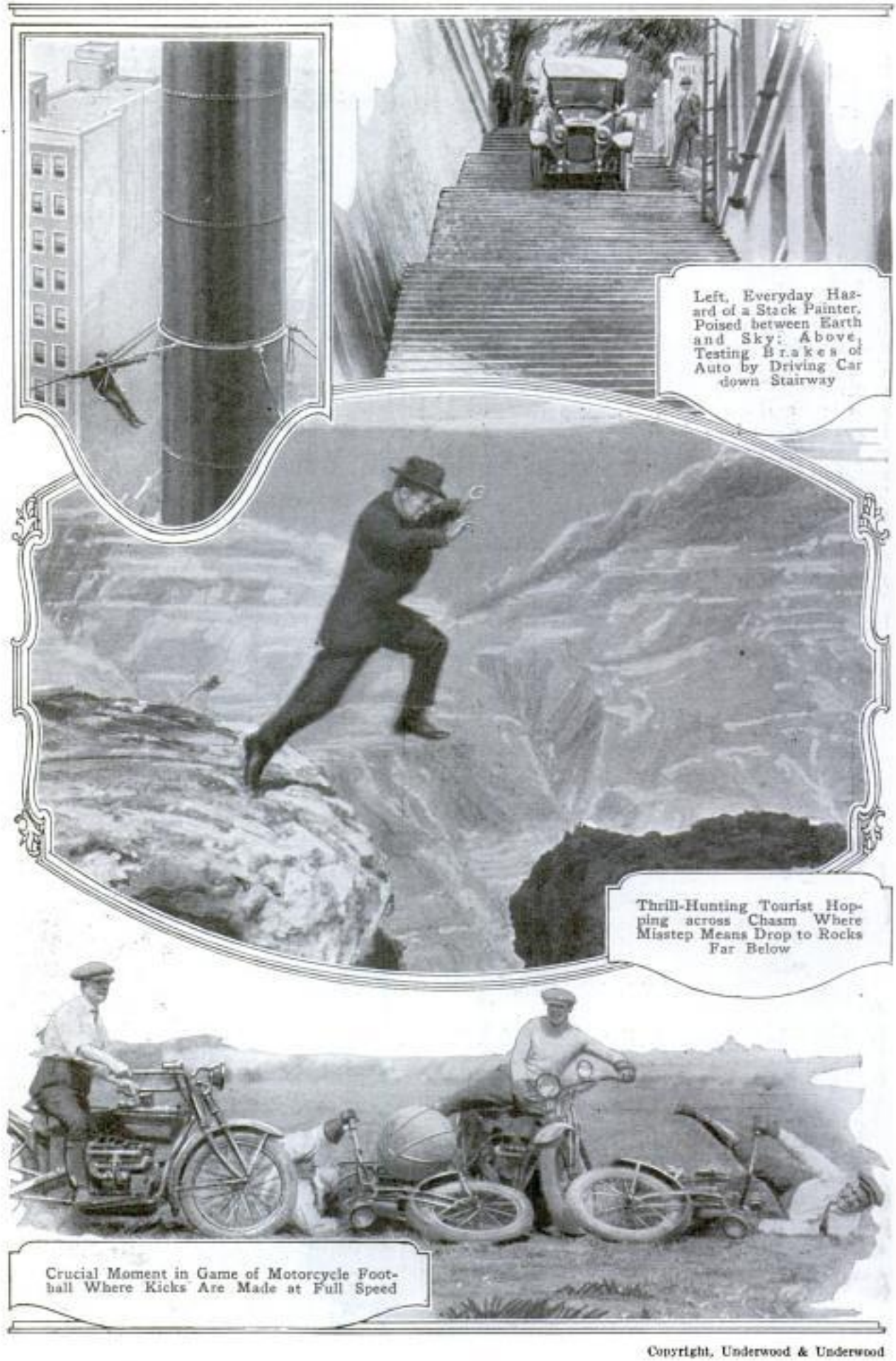

Left, Everyday Hazard of a Stack Painter, Poised between Earth and Sky; Above, Testing Brakes of Auto by Driving Car down Stairway

Thrill-Hunting Tourist Hopping across Chasm Where Misstep Means Drop to Rocks Far Below

Crucial Moment in Game of Motorcycle Football Where Kicks Are Made at Full Speed

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Fleeing from a "Burning" Hotel with a Pocket Fire Escape, Dropping from the Twelfth Story to the Street Suspended by a Thin Cable

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Riding a Motorcycle with Sidecar Cossack-Fashion, an Amateur's Dangerous Stunt in a Contest

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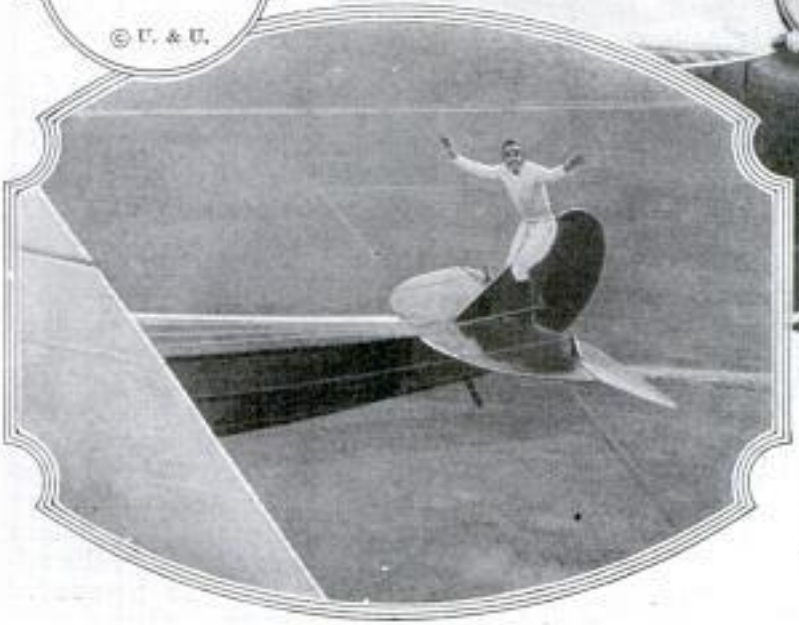

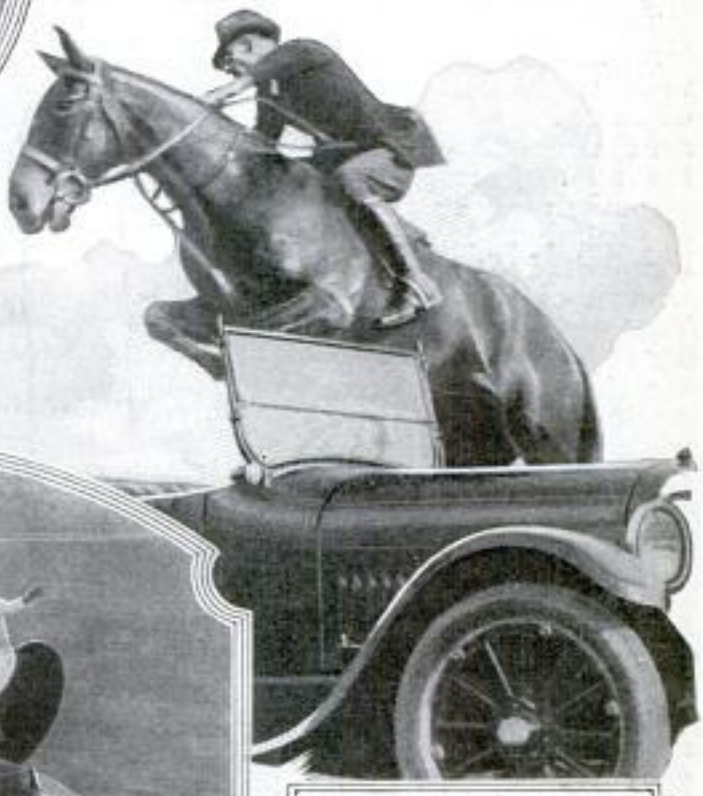

Hurdling an Auto, a Feat Requiring Nerve in Both Rider and Horse but They Get over without Touching

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Left, Daredevil Aviator Skimming through Space on the Tail of an Airplane

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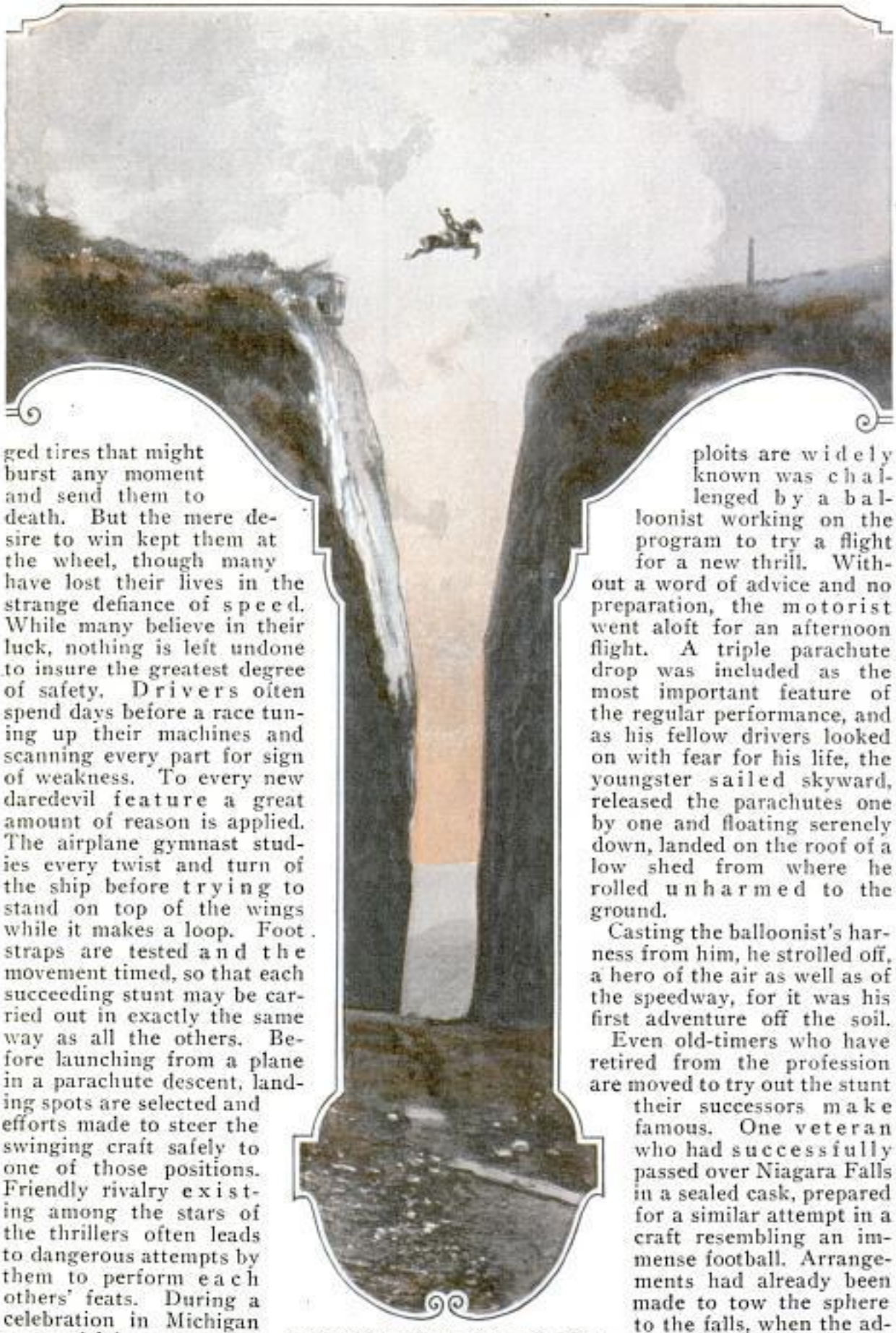

Movie Trick Scene Taken in Two Exposures with the Use of a Film "Mask"

ged tires that might burst any moment and send them to death. But the mere desire to win kept them at the wheel, though many have lost their lives in the strange defiance of speed. While many believe in their luck, nothing is left undone to insure the greatest degree of safety. Drivers often spend days before a race tuning up their machines and scanning every part for sign of weakness. To every new daredevil feature a great amount of reason is applied. The airplane gymnast studies every twist and turn of the ship before trying to stand on top of the wings while it makes a loop. Foot straps are tested and the movement timed, so that each succeeding stunt may be carried out in exactly the same way as all the others. Before launching from a plane in a parachute descent, landing spots are selected and efforts made to steer the swinging craft safely to one of those positions. Friendly rivalry existing among the stars of the thrillers often leads to dangerous attempts by them to perform each others' feats. During a celebration in Michigan a youthful automobile-racing driver whose exploits are widely known was challenged by a balloonist working on the program to try a flight for a new thrill. Without a word of advice and no preparation, the motorist went aloft for an afternoon flight. A triple parachute drop was included as the most important feature of the regular performance, and as his fellow drivers looked on with fear for his life, the youngster sailed skyward, released the parachutes one by one and floating serenely down, landed on the roof of a low shed from where he rolled unharmed to the ground.

Casting the balloonist's harness from him, he strolled off, a hero of the air as well as of the speedway, for it was his first adventure off the soil.

Even old-timers who have retired from the profession are moved to try out the stunt their successors make famous. One veteran who had successfully passed over Niagara Falls in a sealed cask, prepared for a similar attempt in a craft resembling an immense football. Arrangements had already been made to tow the sphere to the falls, when the adventurer was persuaded to give up the trip.

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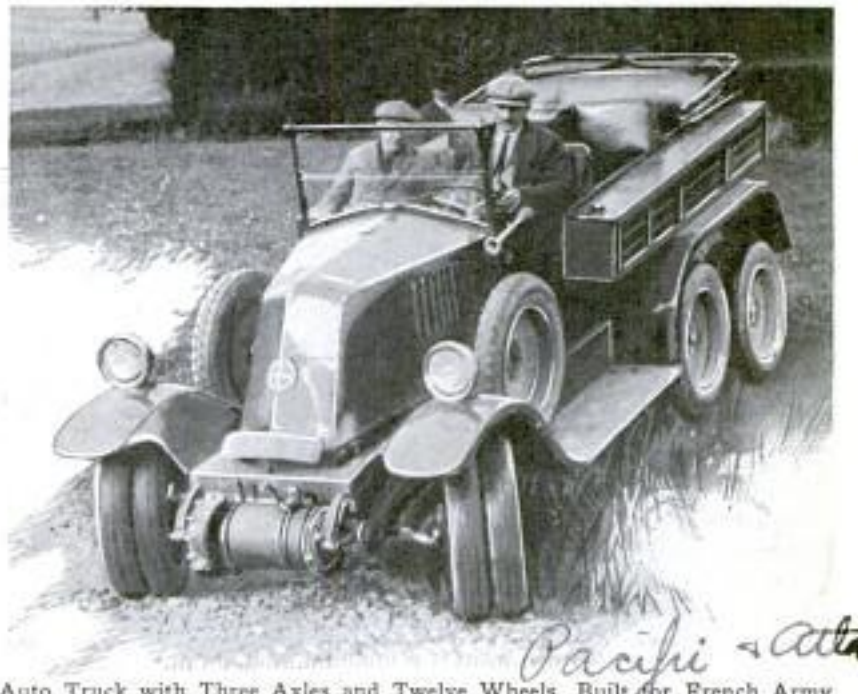
Roman City Unearthed in England Had Wall Twenty Feet High

Further knowledge of the life of the Romans in Britain is being gained with the uncovering of the ruins of the 2,000-years old city of Isurium near Harrogate. Surrounded by a wall a mile in circumference, nine feet thick and twenty feet high, it covers nearly seventy acres and is considered one of the most important archæological discoveries in several years. Coins and pottery found in the debris established the identity of the city, and the location of the ruins corresponds to the place where Isurium was shown on maps of Roman Britain published in the sixteenth century. Portions of an angular tower, probably used for defense, have been dug out near the wall with remains of what appears to have been a grain storehouse.

Army Truck with Twelve Wheels Is Built for Endurance

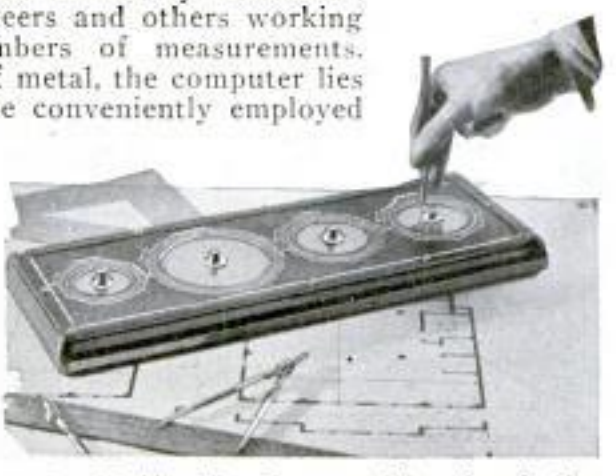
Equipped with three axles each supported by four wheels, an automobile transport truck built for the French army is said to be able to travel at high speeds over almost any kind of road and in case of accident to a tire, delays are avoided, since the extra equipment of wheels prevents the need of stopping for immediate repairs. In sandy and marshy country the machine can move faster than four-wheeled trucks because the treads cannot readily sink to dangerous depths.



Auto Truck with Three Axles and Twelve Wheels, Built for French Army, Crossing Stretch of Soft, Marshy Ground in Test Run

Adding Machine for Feet and Inches Fits Desk or Drawing Board

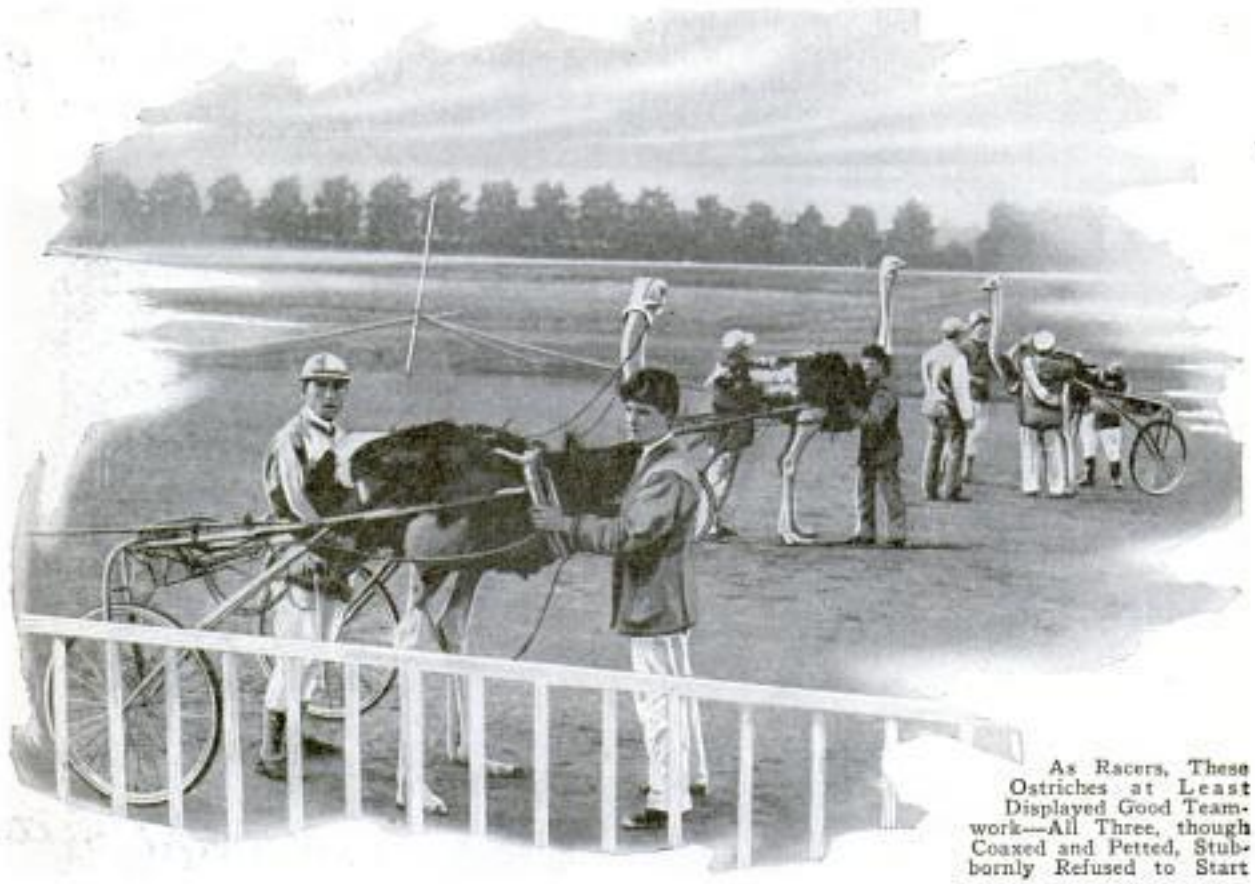
A machine that calculates in feet and inches, including the smallest fractions, has been designed for use by draftsmen, architects, engineers and others working with great numbers of measurements. Made entirely of metal, the computer lies flat so it may be conveniently employed on a drafting board or desk top. The calculator is claimed to be perfectly accurate and to sum up large sets of figures in a few seconds. The machine is easily operated and is built light and compact to permit of its being readily carried about. Both in industrial plants and structural work, the adding device can be used to save time.



Adding Machine That Computes Dimensions in Feet and Inches in Use on Drafting Board

Hears Worms Gnaw Fruit

By connecting an ordinary wireless headphone and an unusually strong microphone to an apple, a South African scientist has been able to detect the sounds worms make in gnawing at the fruit and in biting the leaves and twigs. Another experiment enabled him to detect the presence of weevils in corn in the same way. It is expected that this will be the basis of a practical means of determining the condition of various crops.



As Racers, These Ostriches at Least Displayed Good Teamwork—All Three, though Coaxed and Petted, Stubbornly Refused to Start

Pearl-Bearing Mollusk Also Yields Food and Ornaments

One of the most profitable of all the mollusks from the standpoint of the fisherman, is the abalone, a large species found off the coast of Lower California and in other semitropical waters. Not only does its huge shell produce an excellent quality of mother-of-pearl for buttons, but real

Abalone Shell and Three Pearls Found Fastened to the Multi-Colored Inside Surface

pearls valued at hundreds of dollars are sometimes found in it. The mollusk itself is considered by some a great table delicacy. The whole shells, when cleaned and polished are often sold for ornaments and are prized by collectors of souvenirs.

Ostriches Harnessed like Horses Refuse to Start in Race

As an added attraction to a series of races near Berlin, Germany, three ostriches, bridled and harnessed to sulkies, were driven upon the track and lined up for a race. At the critical moment, however, the big birds refused to start and the contest had to be given up. On distances of about half a mile, ostriches are said to be swifter than the fastest race horse, but after that, they become winded. They have often been broken to harness, but have not yet been taught to rival the four-footed thoroughbreds on the track.

Seeing through Inches of Steel

Penetrating steel of a thickness of more than four inches, X-rays under experiment at Woolwich, England, have revealed the tiniest flaws in the metal, according to a British scientist. The investigators had not been able to see through more than a half inch of iron with the rays previous to the development of more powerful beams, the expert said. The discovery may prove of great benefit to manufacturers and the steel industry in the saving of costs and time of machining work often wasted due to the use of faulty materials.

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India Rubber World 10/1/24
Henry E. Sillcock Waltham, Mass.

Scrap-Rubber Oil Replaces Gasoline as Fuel for Engines

Fuel that is said to have given good results in internal-combustion engines has been obtained by treating a certain kind of scrap rubber in an iron retort and heating it to from 446 to 572° Fahrenheit. At that temperature, the solids break up, and the resulting volatile substances are then condensed in a receiver as a brownish-yellow liquid. This is cooled down to about 212° Fahrenheit and a greenish liquid obtained which has proved a satisfactory motor fuel. In the tests, gasoline had to be used to start the engine, but after a few revolutions, it worked readily with the rubber distillate. Practically complete combustion occurred as there was little smoke in the exhaust fumes.

Safety Guard for Poison Bottles to Stop Accidental Deaths

To prevent deaths and accidents in mistaking poison for medicines, a metal cylinder guard with a strong spring has been designed to fit about the cork of bottles that contain injurious substances. With this attachment, the bottle is clearly identified and cannot be opened by accident. In order to extract the cork, the cylinder must be pressed down. The spring encircling the neck returns the guard to first position when pressure is released, and the contents are poured out through a wide aperture left in the side of the cylinder.

Cylinder Guard "Lock" on Cork to Prevent Accidental Poisoning; Note Side Pouring Slot

Twenty-Five Miles of String Makes Hundred and Fifty Pound Ball

By carefully saving odd bits of string, a Massachusetts man, after several years, has accumulated a ball weighing 150 pounds and containing more than twenty-five miles of cord. Bright-colored pieces from the Orient and from foreign countries are wound with domestic varieties which neighbors have contributed, and at the age of 77, the collector is still adding to the growing ball.

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Henry E. Sillcocks, of Waltham, Mass., Adding Piece to His Giant Ball of String

Monkeys and Apes Raised on Farm to Aid Study of Disease

Monkeys and apes are being raised on a farm in French Guinea by the Pasteur institute for experimental purposes in studying measles, typhus, yellow fever and other diseases that cannot be transmitted to rabbits and guinea pigs commonly used in such tests. Chimpanzees are also kept at the farm, as they are considered the most suitable of all the animal "relatives to the human race" for the studies and also afford material for experiments in psychology. A director is in charge of the laboratory and special buildings have been erected for taking care of the patients while they are given inoculations and treatments.

Burness & Richardson Bromley, Kent, England.
Gardner 9/29/24
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Vacuum Cleaner in Auto Keeps Car and Clothing Free from Dust

Connected directly to the engine, a handy vacuum cleaner for keeping the inside of closed cars spotless and removing

Removing the Dust of Travel from Clothing with Vacuum Cleaner That Also Keeps Car Tidy

dust from the clothing of passengers has been invented. Suction is obtained from the intake and the air passes through chamois skin so that dust cannot get into the motor. The equipment includes ten feet of covered rubber tubing, which is slipped over a shut-off valve mounted on the instrument board or other convenient location. While the engine is running slowly, the nozzle, made of aluminum and specially designed for getting into difficult corners, is passed over the upholstery in the same manner as any cleaner. Dust is collected in the nozzle handle, which may be removed and emptied. When not in use, the tubing and nozzle can be kept in a door pocket or any other small space. Cleaning the car in this way requires but a few moments, does not soil the hands, preserves the life of the upholstery and is far more efficient than the whiskbroom both for the car and the clothing.

Watchmakers' School Helps to Fill Waning Ranks of Craftsmen

Teaching the art of watchmaking, a school in Milford, Mass., prepares its pupils to construct and assemble parts for most every kind of timepiece. It is said that the watch industry loses about 2,000 workmen each year and only 600 are added in the same space of time. The watchmakers' college provides a three-year course composed of designing, drafting and manufacture of clocks and watches. Some of the finest specimens of workmanship in the world have been accurately copied by the students, who also make all the tools used in their work. Many crippled persons with full use of their hands and eyes and disabled war veterans enroll for the trade course and graduate as expert craftsmen. During the last six months of the studies, the "apprentices" are placed in near-by jewelry stores to get actual practice in the work. Positions are sought by the institution for those who complete the term of training, among factories and shops which send large parts of their repair work to the school to be done by the students.

Woodworker Spends Thirty Years Building Cabinet of Knots

Made entirely of knots from different kinds of trees, carefully matched and fitted, a dresser has been completed by a woodworker after thirty years of toil during his spare time. The various shades of color, mellow and rich, that merge in artistic harmony and glow in the brilliantly polished surface, are said to produce an effect as

Dresser Made Entirely of Knots from Trees, That Required Thirty Years to Finish

curious as it is beautiful. It has attracted much attention in Spokane, Wash., the home of the builder.

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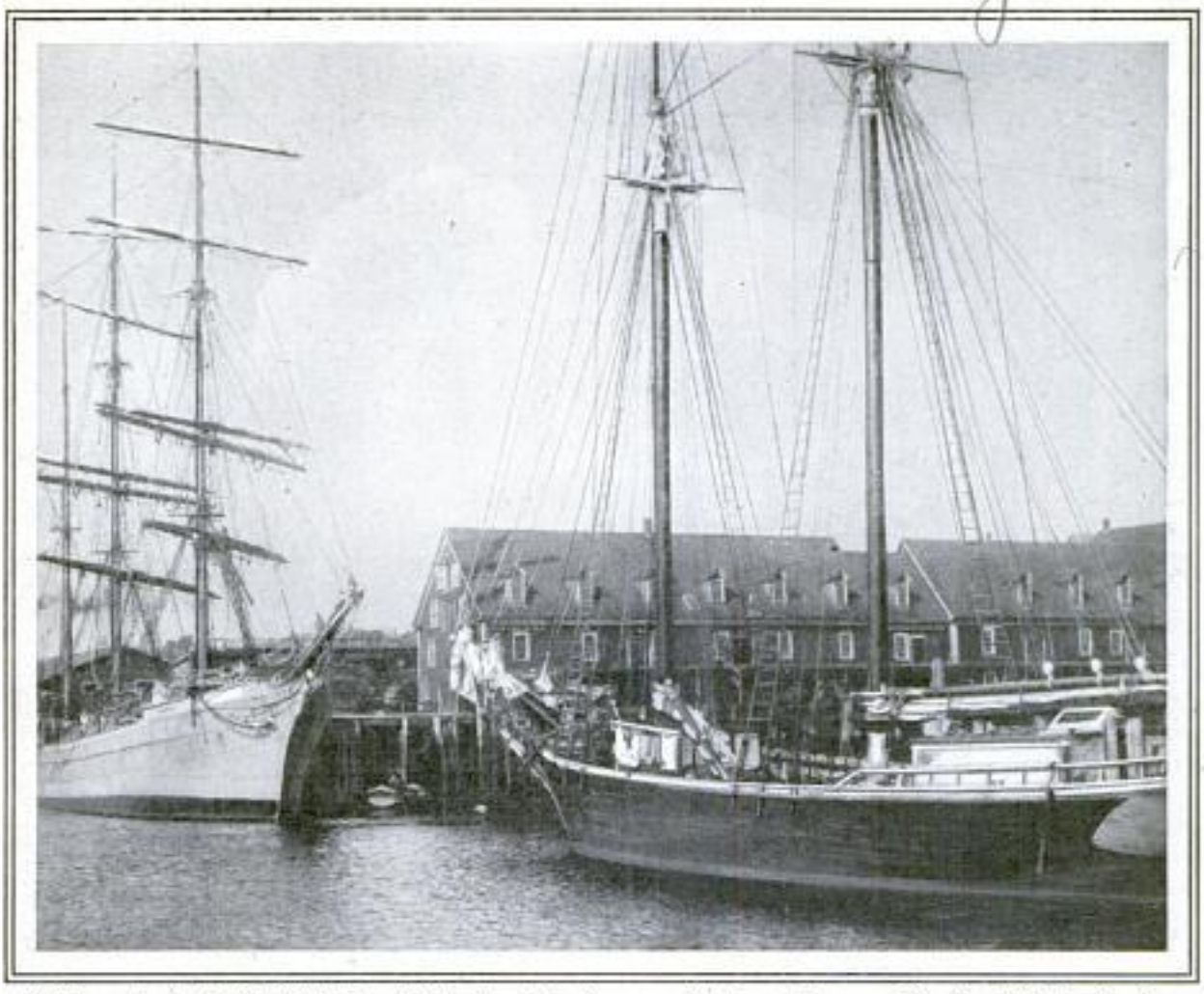

"Spiders of the Sea" Which Trawl Fish from Depths near the Ocean Bottom; Wireless Aids in Keeping Them Informed of the Best Grounds Where the Catches Lie

Fishing with the Aid of Radio

Trawlers of Atlantic Guided by Wireless Find Profitable Waters and Report Catches to Ports While Still at Sea

By G. HAROLD PORTER
General Marine Superintendent, Radio Corporation of America

MEN who go down to the sea in ships now rarely cut adrift from the busy life on land. On freighter or ocean liner radio is the link between ship and shore. It now reaches out through the air to the trawling industry, and the uncertainties of deep-sea fishing are giving way to more intelligent and organized effort.

Trawling is done by dragging large nets over the ocean floor in water from thirty to a hundred fathoms deep. Trawlers, comparatively small vessels, are the spiders of the sea, towing behind them great nets, which fully extended are about 120 feet wide. These nets travel at a distance of seven or eight feet above the sea bottom. The catch consists of the so-called "ground fish"—haddock, cod, hake, and flounders, and the fact is that those who go to sea for fish of these species, play blindman's buff with Father Neptune. The United States and Canadian governments have sought to plot the movements of fish by catching large quantities of them in a trawling net and releasing the most healthy after marking them with a tag or button attached through their tails. Fishermen are requested to return all tags found on fish caught to the bureau of fisheries at Washington, D. C., together with a record of their lengths and place and dates of the catch. Some time ago a large fishing concern put marine radio on all their

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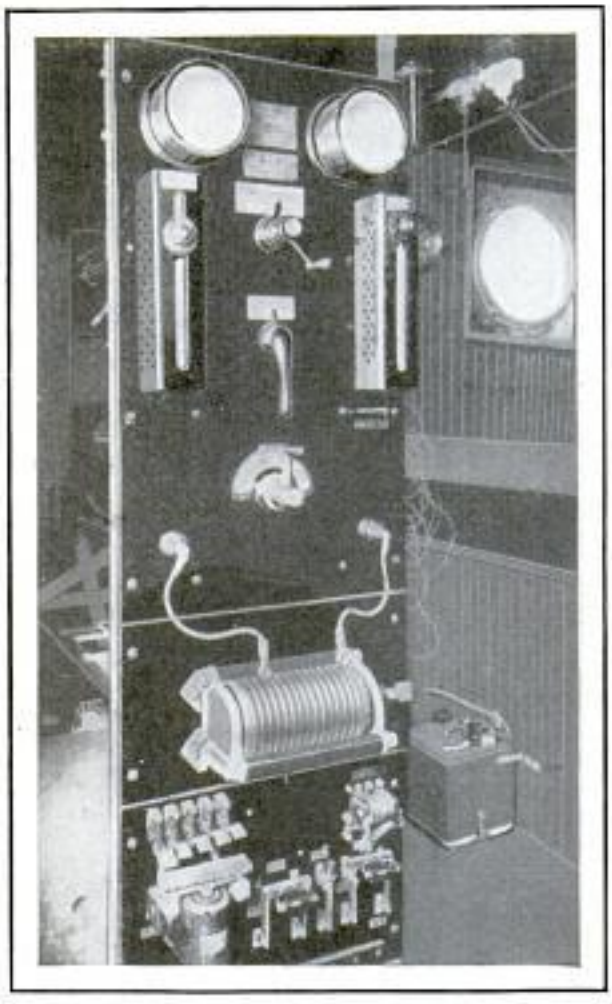

Radio Sending Set by Which Fishing Vessels Report Their Catches before Reaching Port

vessels, for the purpose of communicating with them while the ships are in service out at sea. The change that has since taken place in their trawling industry, perhaps is best described in the words of an official of the trawling company:

"You will understand our situation before we installed radio by considering just one of the conditions necessary to success in our business.

"We must have a boat come in regularly every two or three days, and it is seldom that two boats meet on the 20,000 square miles of fishing area on the banks. So we could not depend on such physical contact in order to bring home the boat with the largest catch. There was no way by which we could communicate with them, if they were lacking in radio equipment as they were.

"Now, when we send a ship out we do not include a specified return date in the captain's sailing orders. We are kept constantly informed of the amount of the catch, and by radio we can order the ship to return to port in six days, or we can keep it out as long as fourteen days, and because we always know just how many pounds of fish of each kind there are on board, selling is made much easier.

"In order to achieve the maximum amount of efficiency, it is essential to cut down each vessel's unproductive time to a minimum and one of the biggest services radio renders is to accomplish just this purpose. Each trawler makes known her port-accommodation needs long before she arrives. In one case a message came to us via radio saying that the 'Petrel' needed new piston rings. Long before the vessel docked, the twenty-four hour job of getting those piston rings ready for installation was completed.

"The 'Fisher' had been out ten days. She had a full catch and was returning to port. The 'Sea Gull,' out only three days, had her fishing gear so badly damaged that it was useless for her to remain on the banks. A radio message from the 'Sea Gull' brought the 'Fisher' hurrying to transfer fishing gear. This message was received at the same time by the company. When the 'Fisher arrived in port, a new gear was ready for her. This effected a saving of three days.

"The second engineer of the 'Sea Gull' decided to quit at the end of the trip. The captain included that news in his daily radiogram to the company. Before the ship arrived in port a new second engineer had been signed up.

"In time of sickness radio renders invaluable service. A ship's captain will hesitate to take it upon himself to go into port with a small catch because one of the men on board is not well. But he decidedly would send a message to port telling the company of the illness of one of the crew. Frequently, the answer comes back to go into a near-by port for medical aid. At other times a medical officer on shore or on board a passenger vessel will give the necessary method of treatment over the radio. Fogs are very dense on the banks. This is especially true in the winter months. Often it is impossible to take the bearings of a vessel for days at a time. A radiogram to shore will bring back a speedy answer that will enable the ship to learn at once just where it is. The direction from the ship to the shore station can be told with unfailing accuracy. When two shore stations of known location flash back the direction, the position of the ship can be worked out by triangulation, and much time heretofore lost in cautiously feeling their way or in laying to, is saved. The safety of all vessels is always enhanced by the regular receipt of weather reports."

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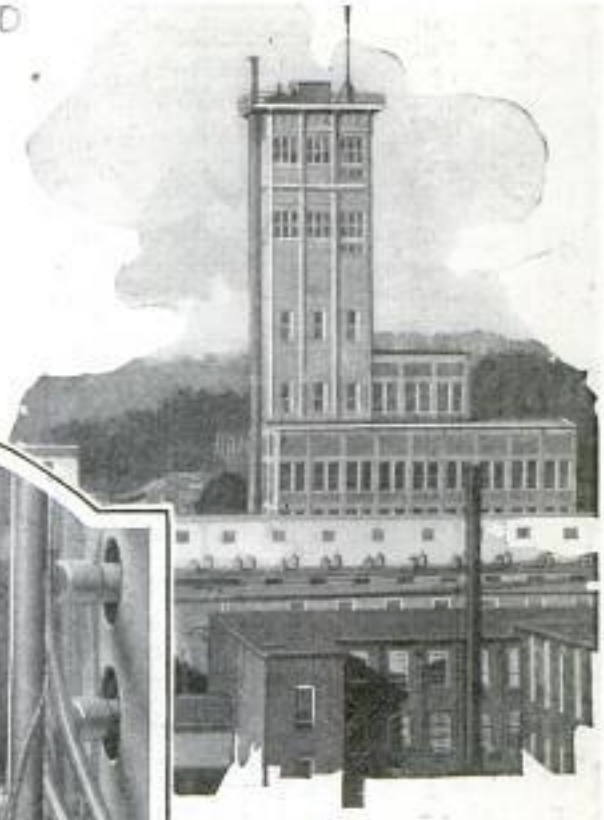
Cont. Robt. H. Moulton.
A. T. Board of Trade
Chicago

Chilled Shot Are Made in Tower Untouched by Human Hands 1840

Pellets for shotgun shells are made without being touched by human hands at any step. Automatic machinery for shot making has developed so far that only four men work in a shot tower with an output of fifty tons a day. The basic process is simple. Molten lead dropped from a great height is formed by natural laws into round pellets as it falls through space.



Interior and Exterior Views of Shot Tower Showing Stream of Molten Lead Pouring through Sieve to Water Tank

At the bottom, a tank of water finishes the cooling process. In developing automatic machinery to sort the shot, grade the sizes, eliminate imperfect pellets, polish the perfect, and sack the output ready for shipment, after it is automatically weighed, many novel machines have been invented. A typical factory starts its operation in a tower 187 feet above ground, where bars of lead are dropped into a melting pot. From the caldron a continuous stream of molten metal flows into a sieve, through which it strains in tiny drops, to plunge through space to the water tank below. From the tank, the shot pass up conveyors to a revolving screen several floors above, which separates rough bits of lead from the round ones, and then they flow by gravity from floor to floor, through other machines.

Tides May Foretell Earthquakes 2020

With the discovery that the tides are definitely affected by earthquakes, scientists declare that close study of abnormal rises and falls may enable them to predict the occurrence of tremors in time to warn people to seek safety before disaster overtakes them. Observers at a weather bureau near Tokyo tested the theory when it was noticed that the tide had been rising steadily off the coast of Choshi until the day of a quake, when it had passed the danger point. The morning after, the water had receded four feet below the former mark. Three months before the great Japanese earthquake disaster of Sept. 1, 1923, it was later recalled, the tide had also risen to the danger point.

Chicago Evening Post
10/16/24

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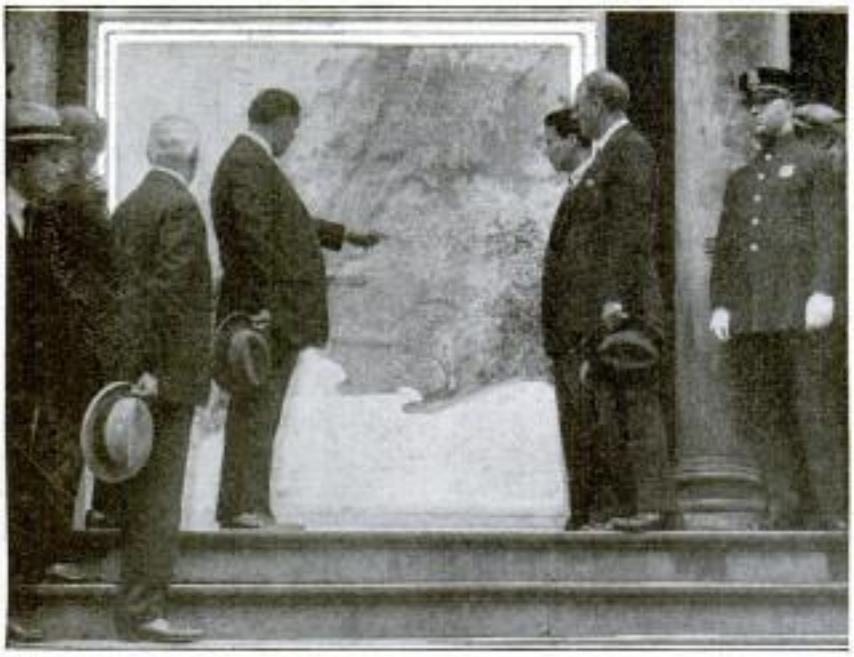
Pacific & Atlantic Photos



Mayor Hylan (Right) and New York Officials Receiving Aerial Map of the City from Representatives of Photographic Company

Two Thousand Aerial Photographs Required in Mapping City

1971

Flights approximating 3,000 miles, the use of three airplanes and 2,000 separate pictures were required to complete a map of New York City which has been presented to the metropolis by officials of an eastern surveying company. The assembled mosaic depicts 625 square miles of territory and is said to be one of the best examples of aerial photography that has yet been made.

Chorus Girls in Rubber Suits Disappear in Stage Pond

1884

The steady march of a whole troupe of chorus girls into a pond of water, from which they do not reappear, is one of the novelty illusions exciting Paris theater-goers. The chorus, dressed in blue rubber costumes designed to look like cloth, appear from a hollow replica of the Sphinx and descend into the pool, walking steadily until their heads disappear below the surface, to be seen no more. They make their exit by way of a valve below the stage. In another Paris theater an imperial crown, ten feet across, appears to Napoleon in one scene, with four living girls posed in graceful curves to fit into the giant design of gilded plaster. In a tableau representing a Venetian garden, the central figure, dressed in the flowing skirts of the time depicted, gradually rises eighteen feet into the air, while lights thrown through the huge transparent cone of the outspread skirt, reaching to the stage, disclose seven girls dressed as birds, dancing within the tent formed by the robe. A hydraulic lift is used to elevate the wearer of the enormous skirt. A pirate raid on a merchant ship, staged in another Paris theater, employs a motion picture of the pirate vessel approaching over the sea, until, when it reaches the foreground, a papier-mache replica of the figurehead of the ship appears in its place before the screen and the pirates leap to the stage. In London tennis matches were staged in one theater on courts of imitation sod, while in another, the American wild-west rodeo was transferred from Wembley exhibition, with the wild horses, steers and cowboys performing behind a screen of invisible steel meshwork.

Cpl. W. R. Miner
c/o St. Louis Star
Mo.

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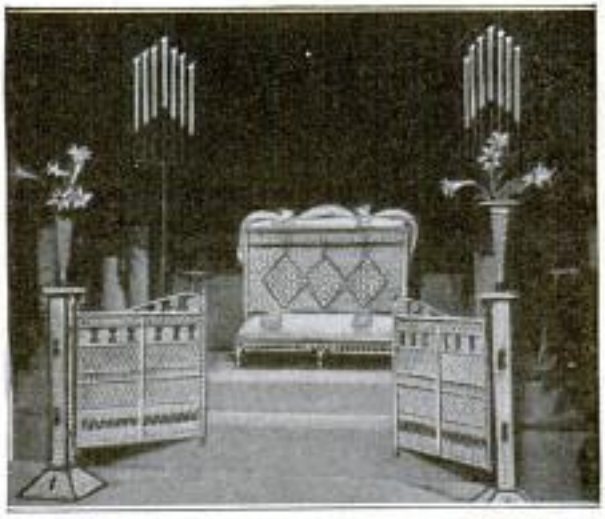
Altar and Pulpit of Wicker Lend Novelty to Church Exhibit

Built entirely of wicker, an unusual church altar attracted much attention in Cincinnati, O., when it was placed on exhibition there. On top of the gate posts



Church Altar and Its Decorations, All of Which Have Been Constructed of Wicker in Varying Shades

are cone-shaped vases suitable for long-stemmed flowers. The pulpit, stool and bench for the pastor and his associates also are of reed in varied and dainty shades.

Felix J. Koch,
Cary & Elleton
College Hill, Cincinnati, O.

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15 77 Cont. Fred Gilman Jopp
207 S. Berendo St
Los Angeles, Calif

Splicing Film in a Movie Factory; Ends Are Carefully Trimmed and Joined by Strong Cement to Prevent Tearing When the Ribbon Is Speeding off the Projector Reel

Movie Film from Camera to Screen

Tireless Industry Working Day and Night Makes Countless Reels of Celluloid That Animate the Silver Sheets

BEGINNING its work of reproduction with the clamorous click of the movie camera, the more than 500,000,000 feet of film yearly consumed in printing the numerous reels of motion pictures daily exhibited in theaters, halls, offices and factories, is subjected to many delicate operations before it is finally ready for the projection machines. Whisked from the camera at the studio or on location, the precious ribbons are rushed to the developing laboratories by speedy and trusted messengers who guard them carefully against injury or exposure to light. When fully developed, they become the negatives from which any number of copies may be printed for screen showings. Such negatives are the only products resulting from the labors of scores of highly paid actors and months of planning and building the sets and scenes whirring cameras record. On receipt of the undeveloped films at the laboratories, they are started through a maze of dark, shadowy rooms under dull

Shaving the Edges of a Print to Give a Smoothly Surfaced Seam

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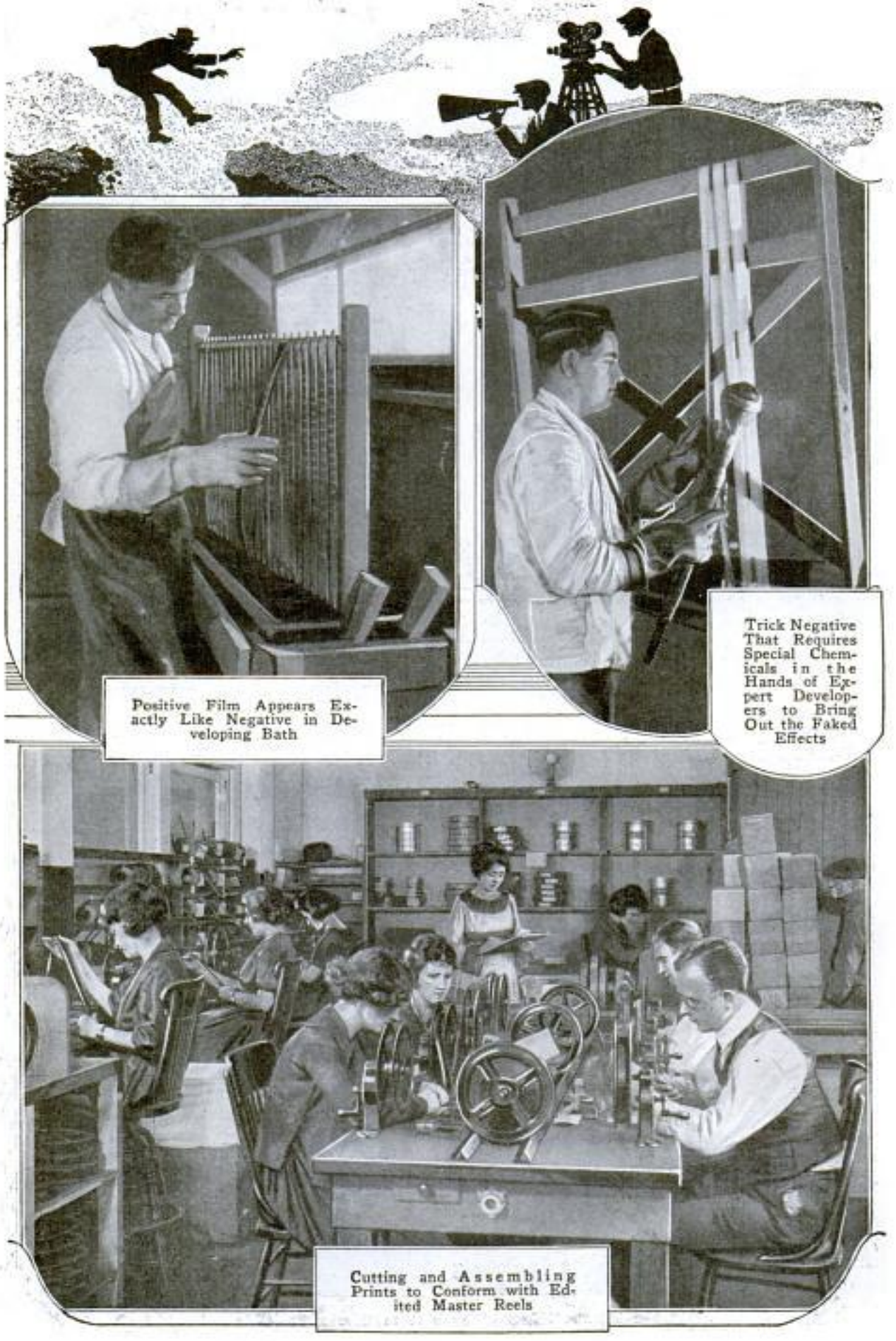

Positive Film Appears Exactly Like Negative in Developing Bath

Trick Negative That Requires Special Chemicals in the Hands of Expert Developers to Bring Out the Faked Effects

Cutting and Assembling Prints to Conform with Edited Master Reels

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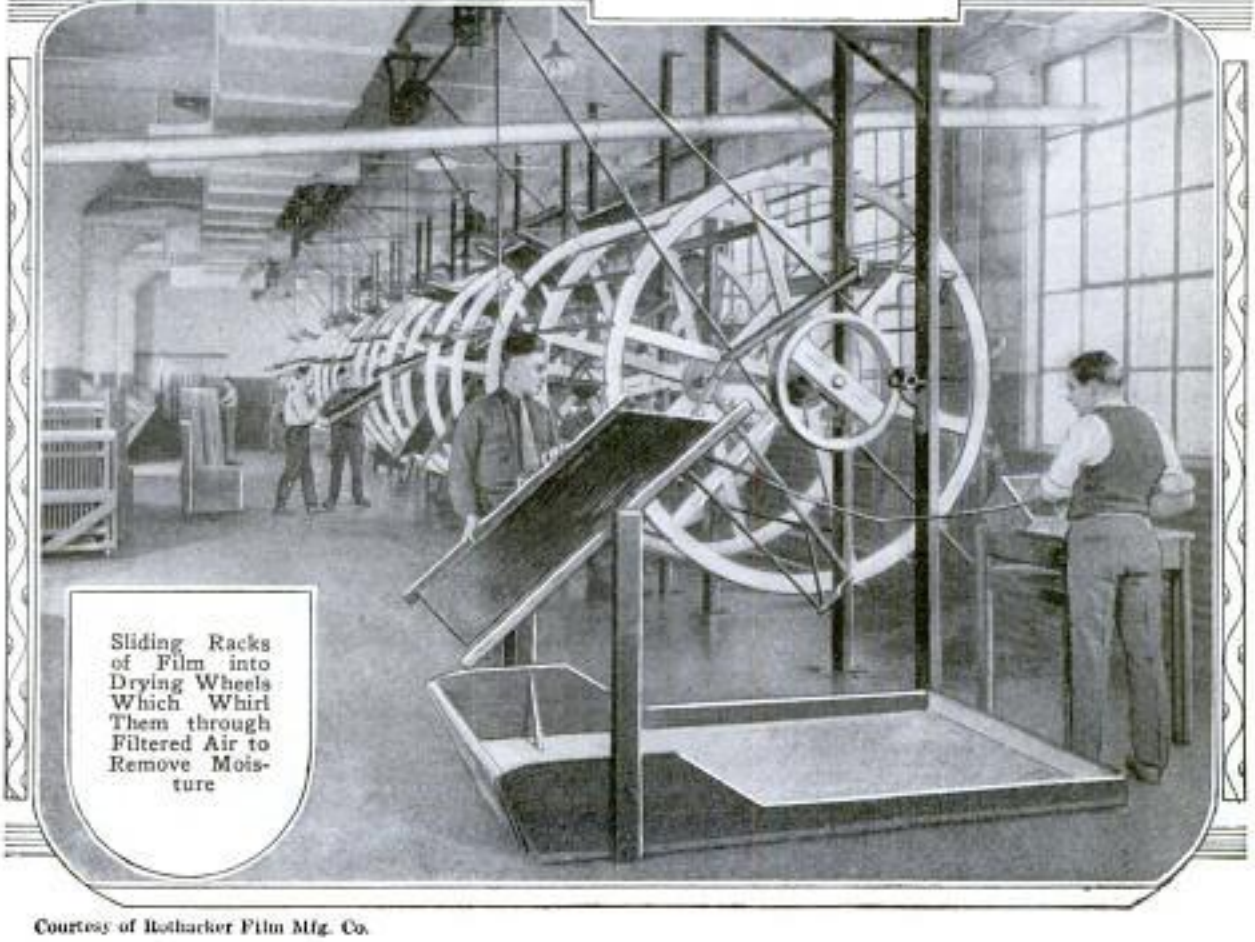
To Guide Film Assemblers a "Key" Plate Is Exposed to Camera before Each Scene



Sliding Racks of Film into Drying Wheels Which Whirl Them through Filtered Air to Remove Moisture

Courtesy of Rothacker Film Mfg. Co.

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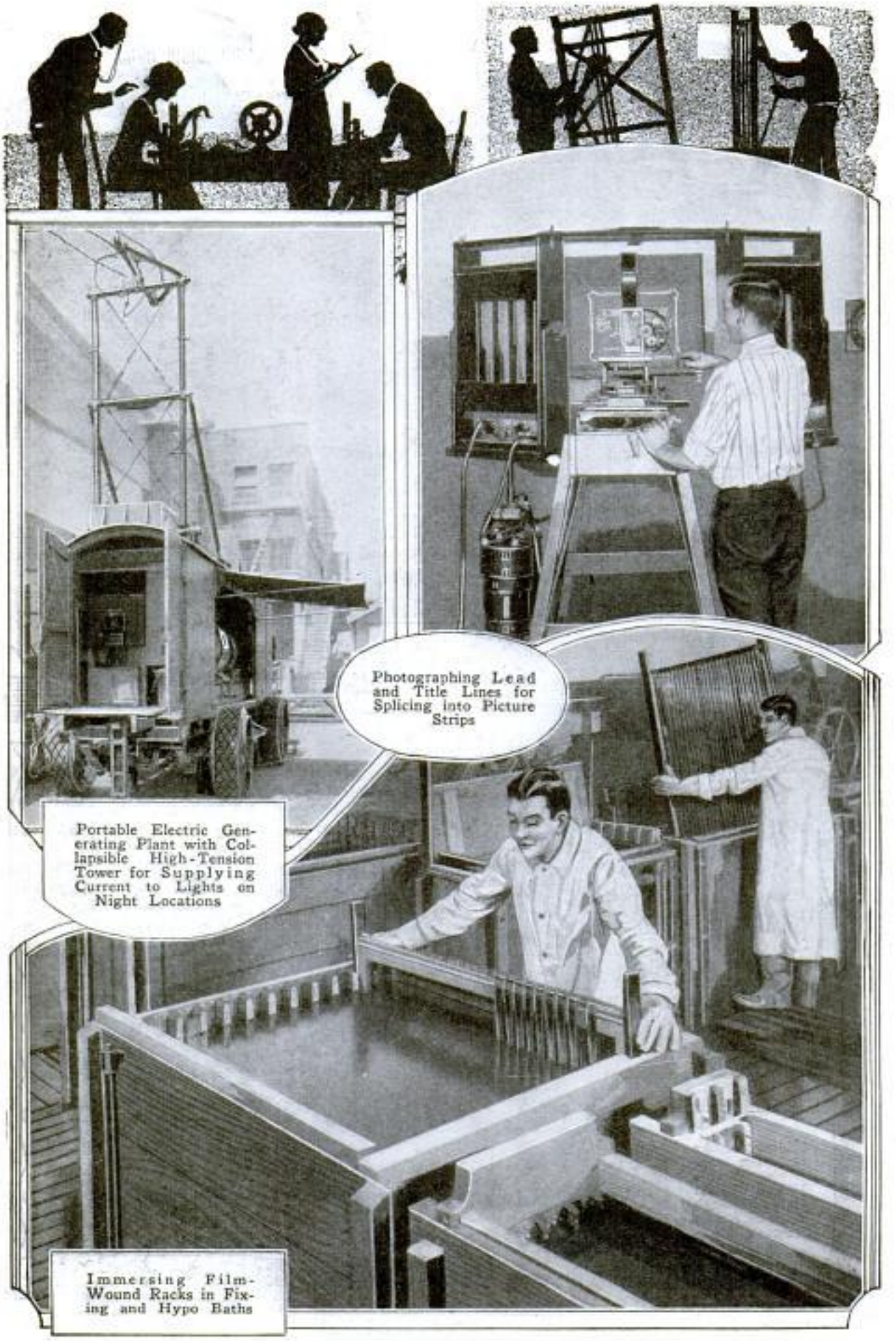

Photographing Lead and Title Lines for Splicing into Picture Strips

Portable Electric Generating Plant with Collapsible High-Tension Tower for Supplying Current to Lights on Night Locations

Immersing Film-Wound Racks in Fixing and Hypo Baths

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Assembled and Finished Film Is Spread over Revolving Drums for Polishing and Cleaning before Packing

After Developing, the Racks of Film Are Rinsed in Tanks of Distilled Water

Marking Exposure Time for Direction of Printing-Machine Operators

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rays of deep-red lights where they are treated with various solutions that disclose the hundreds of tiny pictures and set the coating on the strips so it cannot be disturbed under careful handling. A positive print is then made and returned to the studio for inspection, while the negative is deposited in a fireproof vault to await future requirements.

Raw film from which the positive or exhibitors' reels are made is received in circular metal cans each containing a thousand feet. The packages are opened only in a dark room equipped for that purpose and reach the printing department without being touched by any light other than the dull-red glow under which all work is performed until the strips have been passed from the fixing or hypo baths, when light becomes harmless to them. As a reel may contain both interior and exterior scenes, exposure time must be determined for the various degrees of tones and shadows covering the different sections. Experts in the measurement of exposure estimate the periods while passing the negatives across a glass panel illuminated from beneath by a strong light. Each change is carefully marked and a machine cuts notches along the edges of the ribbon so that a warning buzzer on the printing device can be operated to notify the attendant when the period of exposure is to be decreased or increased. When prepared for copying, the negatives are wound in lengths of 200 feet and run through the printing machines. So fast do these work that but four minutes are required to complete one of the wound lengths. As soon as the reels are exposed, they are wound over large flat racks for developing and fixing in another room. Thoroughly washed in pure water, they are allowed to drain and are then put into a rapidly rotated device which drives off most of the remaining moisture by means of centrifugal force. In the laboratories of the Rothacker Film Manufacturing company, drying is accomplished by means of gigantic revolving drums fitted with grooves to receive the film racks. Constant motion through filtered air while on the wheels, removes any traces of moisture the draining operations may leave on the film.

After inspection the film is taken to the assembling rooms where the sections are united in one continuous length. The film is first polished and waxed along the edges and then is projected on a small test screen for inspection. Here flaws are revealed that generally are not visible on the bare film. Digs, scratches, dirt, misprints and misframing call for replacement of those sections where they occur. Substitute film which has been prepared for this purpose is used for the corrections, and a final inspection certifies the reel for the cleaning that precedes its packing for shipment or storage.

Gathering and Slicing First Prints from Which Directors and Film Editors Select Scenes and "Takes" for Assembling into Full Feature Reels for the Movie Screens

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Motorboat Run by Compressed Air Steered without Rudder

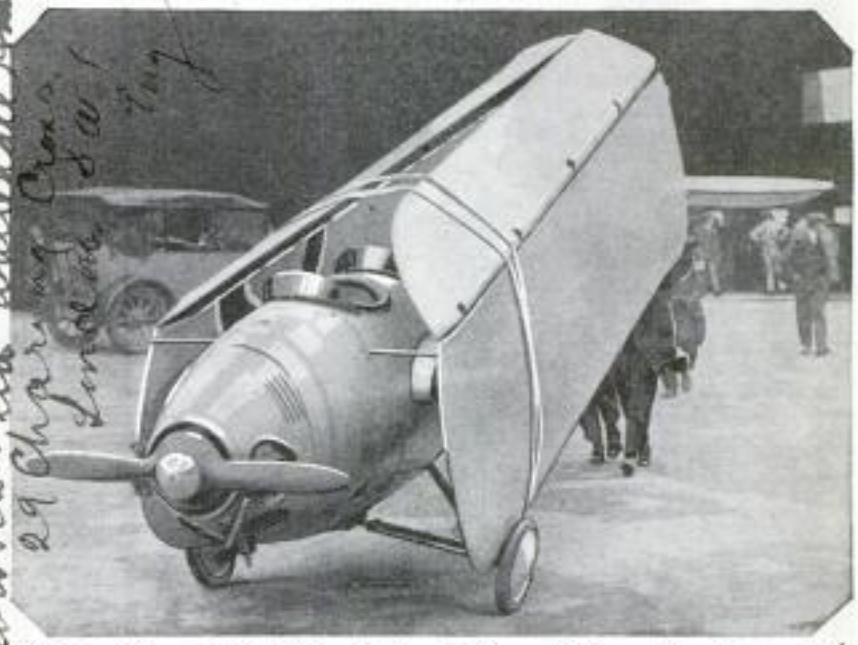
Run by compressed air, a thirty-five-foot steel motorboat has been built in England to demonstrate the claims of the inventor for this method of propulsion. It is equipped with a three-horsepower gasoline engine that drives an air compressor of special type, capable of giving over 200 cubic feet a minute. The air passes either through a specially designed valve or through two large corrugated grids beneath the hull. The latter have about 5,000 outlets and the air rushing from them, propels the boat. Two smaller grids are placed forward so that movements astern can be made. The inventor claims that with the special valve, the boat can be maneuvered without a rudder although one has been provided as a means of comparison.

Wrench Adjusted by Turn of Handle Saves Time and Has Tight Grip

Quickly clamped to pipes or bolts by merely turning the handle, a steel wrench with a powerful and easily adjusted grip has been designed for a wide variety of uses. Thumb and finger screws are eliminated, the action being caused by turning the handle to open or close the jaws. Once in place, and clamped by a turn of the wrist, the grip is increased while turning, as part of the power is passed to the jaws through the screw handle, thereby lessening the danger of slipping. Providing a positive grip, the wrench is well suited for automobile purposes, on high reaches and for use about hot engines. It is simply constructed of a few interchangeable parts.

Small Airplane with Folding Wings Solves Parking Problems

One of the difficulties in the way of wide-spread use of airplanes is the parking and storage problem. A solution has been offered in a tiny collapsible plane exhibited in England. Its wings fold close to the fuselage and it can be housed in a small hangar. It is so light that it can be trundled around like a wheelbarrow.



With Its Wings Folded, Tiny Airplane Is Scarcely Bigger than Auto and Is Easily Trundled by Hand into Hangar

Race in Drilling Oil Wells Shows Advantage of Electric Power

Crews of two rival oil companies in California, one using electric and the other steam equipment, staged a race not long ago in drilling wells. Both started on the same date and although the men using the electrical machinery were inexperienced, both finished together thirty-eight days later. According to reports, it cost only $15.81 per day to operate the electric driller while nearly $100 daily was spent on the steam equipment. The electric outfit, including three motors, was said to have been salvaged for about ninety per cent of its full value, considerably more than was realized from the other apparatus, and no accidents or breakages, such as marked the operation of the steam plant, occurred with the electric drill.

¶More than ten centuries before it was known in Europe, weaving was practiced in China.

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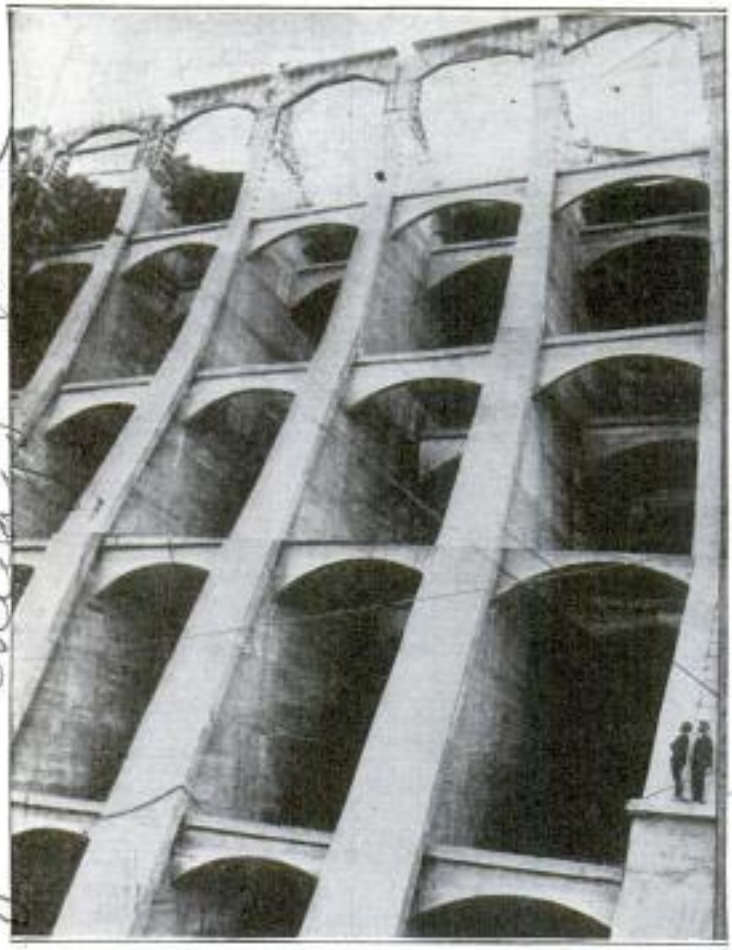

How Arches Are Built in Tiers to Add Strength to Giant Concrete Dam in San Gabriel Mountains

Arches in Tiers like a Honeycomb Lend Strength to Dam

Made up of thirty large arches, a dam 725 feet wide and 170 feet high has been constructed near Palmdale, Calif. The face of the barrier is said to measure almost three and a half acres in area. Resembling a honeycomb in form, the arches, each of which is a dam in itself, are ranged in tiers and are reported to compose the highest wall of its kind in this country.

Portable X-Ray Is Help to Plumber in Finding Pipes and Timbers

No longer will it be necessary for X-ray work to be done in a special laboratory with complicated arrangements of high-voltage equipment and protective devices, as an apparatus has been developed that is both portable and safe, weighs only twenty pounds and is merely connected with an ordinary extension cord to the nearest socket of the house circuit to operate it. One of the most important opportunities of usefulness for the new apparatus is in the medical field. For the dentist, it can be mounted on an arm attached to the wall where it is quickly accessible so that he can follow his visual inspections with a radiograph without disturbing the patient. It is also expected to prove useful for school and college work and in many of the trades. For instance, there recently arose a case where a contractor needed to know the location of pipes and timbers within the floor of a home. The necessary information was quickly obtained with the outfit. The apparatus was placed on the floor of the room below with an operator, and the observer in the room above was able to study the floor with a special kind of screen. The pipes and timbers were thus easily seen and their location determined.

Cowcatcher for Autos to Protect Pedestrians

Motor cars in Paris are being equipped with strong wire cowcatchers as a means of decreasing the alarming number of accidents to pedestrians. A lower meshed shield in front of the wheels is suspended in somewhat the same manner as a bumper and serves about the same purpose. Above it is a basket fixed between the mudguards and directly in front of the radiator. The arrangement is designed to prevent running over a victim and to deaden the shock of a collision sufficiently to prevent fatal injuries.

Copyright, Keystone View Co.

Pedestrian Thrown into Basket Instead of under Wheels by Auto Cowcatcher Guard

¶ Aluminum shoes with wooden soles are being manufactured in Germany.

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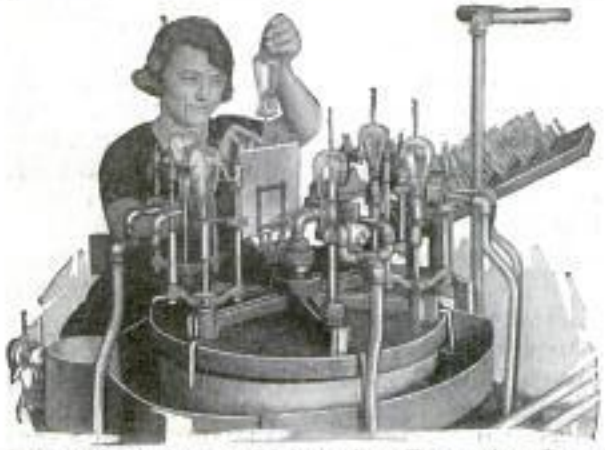
Courtesy of Gen. Electric Co Schenectady, NY

Colored Crystals Festooning Jeweled Pylons and Smoke Pots in Resplendent Display, Illuminated by Electric Fireworks and Battery of Thirty Eighteen-Inch Searchlights of 7,500,000 Candlepower Each

Lighting to Safeguard Eyesight

Electrical Laboratories Develop Science of Utilizing Artificial Daylight in Ways That Will Not Endanger Eyes of Workers

THOUSANDS of eyes are being saved from injury by the scientific application of the theories of artificial lighting, developed in electrical laboratories within the last two decades. Practically the entire science of lighting has been written since the first big experimental institution of this kind was established twenty years ago. Prior to that time little or nothing was known about properly designed and distributed lighting fixtures, nor, until the development of the tungsten light, was lighting available in large and yet cheap units to permit illumination that rivals daylight. The application of science to lighting has made its greatest advances in industrial establishments, where managers realize the monetary value of preventing eyestrain from too little light or from too much.



Sealing Incandescent Lights after Evacuating Pump Has Withdrawn All Air from Bulb

Illuminating engineers design the placing of each lamp to eliminate glare and shadows, and yet light an entire interior, instead of, as was the custom only a few years ago, a small circle over each machine and bench, while the rest of the floor remained in darkness. Along with the development of light has

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Street Lamps on Test Lines Where They Are Subjected to Severe Burning Conditions as Part of Inspection to Determine Their Ability to Operate in Outdoor Service

come similar scientific study of wall colors, and the advantages of painting portions of machines white or gray to reflect additional light on the work. The same investigation has been given an inverse application in such places as railroad Y. M. C. A. buildings, where three shifts of men must sleep by day as well as night. There walls and furniture are treated in colors reflecting but little light because this makes sleep more restful.

The improvements in lighting in the twenty-four years of the present century exceed those of all the ages that went before, although the beginning of modern illumination may be said to date from 1879, when Thomas Edison gave the first practical electric lamp to the world.

Modern home and factory lighting, automobile, boulevard and street lights, flood lighting of buildings, the motion-picture projector—all were made possible by electricity. The first illuminating laboratory was established at Schenectady, N. Y., in 1901, and from it have come many of the betterments adopted, from the arc to the latest word in lighting—the gas-filled tungsten globe.

The manufacture of incandescent lamps is an extremely specialized industry requiring complicated machinery and most skillful workers. The automatic glass-blowing machine, one of the latest aids, is capable of producing 50,000 perfect lamp bulbs a day. In manufacturing a lamp, a stem with supports and filament is made and inserted in the bulb, the flange on the glass stem tube is welded to the neck of the bulb, the air is exhausted, the bulb sealed and the base put on. In the new gas-filled lamps, after the air is exhausted, an inert gas, such as nitrogen, is put in its place. The support for the filament, known as the spider, includes the stem, the leading-in wires, the button rod, and the supports. The tungsten filament, finer than a hair in most lamps, is nearly two feet long in the usual home-lighting unit.

Between fifty and sixty inspections and tests are made of each lamp during manufacture, to guard against more than a hundred possible defects, such as wrongly cut tubing and supports, improperly annealed glass, cracks, chips, crooked parts, glass melted too much, short circuits and open circuits.

The progress in illumination is shown by the comparison of manufacturing figures in 1907, near the close of the carbon-lamp era, and in 1923. In 1907, 65,500,000 lamps were sold, as compared to 225,000,000 in 1923, an increase of 246 per cent. More interesting still is the lighting ability of the carbon and tungsten lamps, as expressed in lumens, or light units. The 1907 carbon lamps had a total of 11,430,000,000 lumens, as compared to 150,750,000,000 in 1923.

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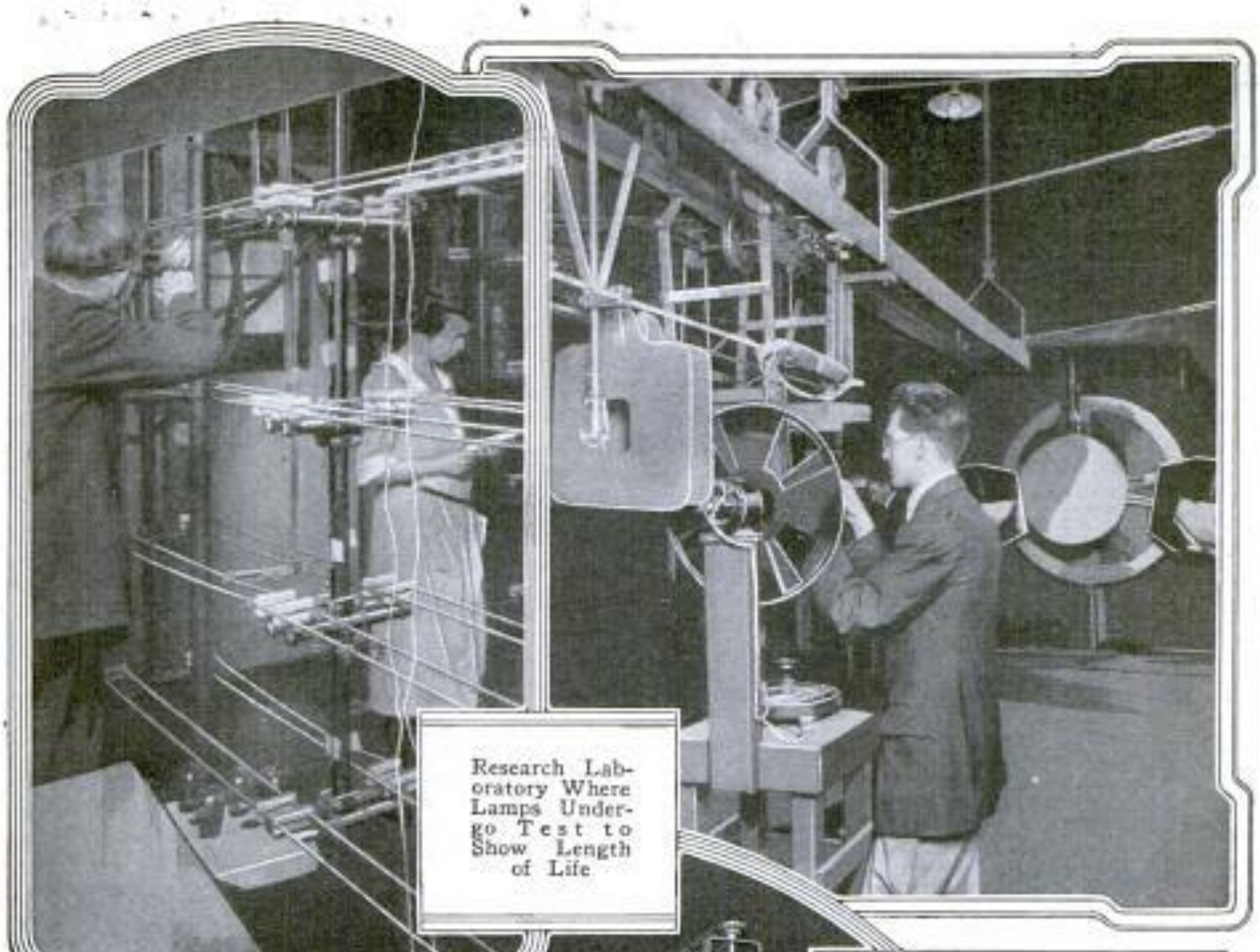
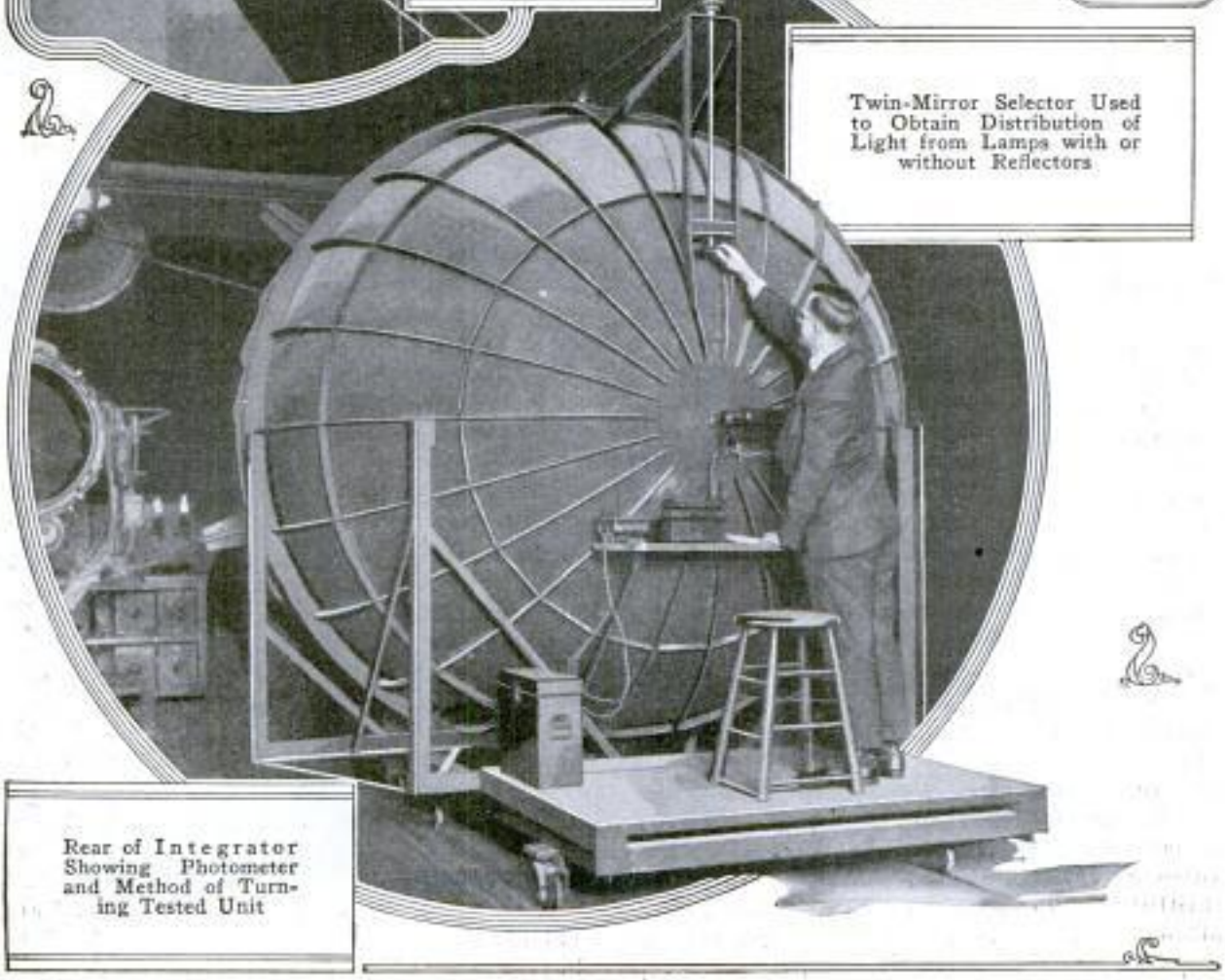


Research Laboratory Where Lamps Undergo Test to Show Length of Life



Twin-Mirror Selector Used to Obtain Distribution of Light from Lamps with or without Reflectors

Rear of Integrator Showing Photometer and Method of Turning Tested Unit

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Portable Stand for Traffic Police Guards Officer from Injury

A traffic officer's stand designed to protect the occupant from injury has been devised by the Boston police department.

Secure and Shaded on His Wheeled Platform, Traffic Policeman Can Perform Duties Better

The platform consists of a round wooden floor inclosed by a guard railing of iron pipe, and is elevated several feet above ground to afford the policeman a clear view along the streets. An automobile rear-view mirror attached to the railing aids him to see the movements of cars emerging from a near-by subway tunnel. Rubber matting on the floor forms a comfortable surface on which to stand and a large umbrella shields the officer from rain and rays of the sun. When traffic is light or at night, the device can be moved out of the way by means of two small wheels fastened on the side.

Sixty Thousand Cures Are Credited to "Artificial Sun's" Rays

The burn caused by one minute's exposure to the beams of a violet-ray lamp of quartz glass which creates "artificial sunlight," is said to equal that received during an entire day spent at a beach in midsummer. The lights for producing these strong rays are undergoing tests in an eastern laboratory to develop a heat similar to that of the sun, which may be used in the treatment of human ills. Instruments that furnish light and warmth many times more powerful than those received from the solar planet have been employed with beneficial results in more than 60,000 cases of hay fever, bronchial asthma, fracture and industrial injuries, according to Dr. A. J. Pucini, speaking before the National Safety Council at Louisville. One type of ultraviolet-ray lamp, he said, achieves in a few seconds what natural sunlight accomplishes in two days. The sun is declared by the scientist to send out powerful forces of light and heat which are absorbed in various quantities by different people. Physicians and surgeons resorting to artificial sunlight have been greatly assisted in relieving numerous stubborn afflictions, said the speaker, who attributes the progress in uses of such instruments to discoveries made while treating disabled veterans of the World War.

Small Die-Casting Outfit Makes Two Hundred Pieces an Hour

For the manufacture of miniature castings, an easily operated outfit of few parts has been devised for the special use of young mechanics and students of manual training and for printers, pattern and tool makers. It is designed so that it can be screwed to the workbench, is equipped with piping, burners and a sample die, and has a pot that will hold fifteen pounds of metal. By lowering a lever, the molten material is forced into the cavity of the die, which is clamped to the nozzle of a piston. When the lever is lifted, the die is taken off and the casting removed. It is claimed that this apparatus, which is only twenty-two inches over all, will mold as many as 200 pieces an hour.

Die-Casting Apparatus Complete, Including Piping Attachments and Samples of Articles It Makes

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The Violin Maker Working on a Tiny Instrument for a Circus Midget, Using a Collection of Miniature Steel Planes to Smooth the Maple Back

Underwood Underwood

Gathering Fortunes in Old Violins

America Becomes World Center for Famous Old Musical Masterpieces Valued at Untold Thousands of Dollars

AMERICA has become the center for the world-wide trade in rare old violins, with the greatest individual collection ever assembled stored away in the vaults of one musical house alone.

This collection, while not large, is valued at more than $500,000, according to the price list in the company's current catalog. That it does not take many old violins to make a half-million-dollar collection is shown by the fact that four of those listed are given a total value of $100,000.

To some of the several hundred thousand people in the United States alone who own violins bearing the names of Antonio Stradivari, Nicola Amati, Giuseppe Guarneri and others of that remarkable coterie of workmen who brought fame to Cremona, it may come as a surprise, but the fact is that their violins are not genuine. How many practically valueless imitations are hidden away, closely treasured, in this country alone experts cannot say, but declare a few hundred thousand is a conservative estimate. Hardly a day passes without another Strad being discovered in some part of the country. To have made all the violins which bear his name the famous old workman would have had to use the quantity-production methods of Henry Ford, and an industrial plant the size of a modern automobile factory. Altogether the world holds some 300 valuable violins patterned by Stradivari, and every one of them is known, its owner listed, and any changes in ownership carefully followed. Valuable violins are not being discovered in trunks long locked, among the possessions of aged recluses, in out-of-the-way farm houses or in rubbish-filled attics. In fact, the entire world has failed to yield up a single genuine Strad in the last seventy-five years, though every byway has been combed by the searchers.

The Betts Strad, one of the finest in

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England, came to light some sixty years ago when a stranger took it into the music store run by Betts and sold it for $5. The music dealer sold it for about $7,000.

An eccentric Italian carpenter named Tarisio abandoned his trade in the early part of the last century and began searching every nook and corner of Italy for Cremona fiddles. When he died, in 1854, in a wretched attic in Milan, he was found surrounded by a confused pile of 250 violins. A Paris dealer rushed to the scene and bought the lot for $15,000. A single Strad from the collection later sold for $10,000, and most of the others brought very good prices.

While all violins look more or less alike to the layman, the expert can not only tell the maker, but the period of his life during which he created it. In thus identifying an old master off-hand he considers its shape, its sound holes, arching, inlay, miter joints, waist, curves, general workmanship and varnish.

The one thing he never considers is the label inside. A bit of faded paper reading "Antonius Stradivarius, Cremonensis, Faciebat Anno 1694" means nothing, for the practice formerly existed of thus marking violins made after the model of various genuine Strads. To that practice may be attributed the many thousands of cherished, but worthless violins which turn up every year.

A Time-Yellowed Label Reading "Antonius Stradivarius, Cremonensis, Faciebat Anno 1721," Does Not Necessarily Mean That the Master Made the Violin; in Fact Some Hundreds of Thousands of These Labels, Including the One in the Picture to the Left, Are Pasted in Instruments Which Merely Duplicate the Style Followed by Stradivarius in the Year Indicated

Six Violins Worth $119,000; the Spanish Strad of 1722, on the Left, and the Duke of Edinburgh Strad, in the Small Case, Are Each Valued at $25,000; the Others Are the Ludwig Strad, Valued at $22,500, the Lord Nelson Strad, Worth $16,000, and a Guarneri Violin, Worth $18,500, While the Connoisseur Holds the $12,000 King Henry Amati; on the Right Is the Bow Maker's Shop

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Town Three Miles Away Is Shaken by Sixteen-Inch Gun

First tests of the sixteen-inch coast-defense guns at Fort Tilden, one of the defenses of New York harbor, shook the houses in the village of Rockaway Park, three miles away. The heat of the flaming powder which flashed from the barrel could be felt at a distance of 1,000 feet, and the 2,400-pound shells themselves were visible to spectators for several miles as they sped out to sea. A three-quarter charge of powder drove a shell nearly ten miles, while a full load of four 215-pound charges will give a much greater range.

Roadside Phones on Auto Highways Aid Motorists in Emergency

Emergency telephone service has been established for the convenience of motorists along 1,500 miles of highway in Pennsylvania. The instruments are located at intervals of one mile in cabinets attached to poles and have uniform locks. Members of the service are provided with keys, giving them access to any telephone on the system. In each cabinet is placed a card with the names and numbers of the nearest garage, doctor, hotel, ambulance, police and fire station, so aid may be summoned quickly. The plan automatically makes each member an agent of the forest-fire prevention forces of the state and also gives him free towing service within a radius of ten miles.

University for Butchers

Providing courses in the dressing, cutting and handling of meats as a means of aiding butchers to prepare their products for markets, a meat-trades university established in London enrolls its pupils from among workmen engaged in the industry. Special studies are included to train the scholars in the management of stores, judgment of cattle, and making of sausage and smoked meats. Beginners are admitted to the school without cost, but a small fee is charged for each lesson of the higher courses.

Far Distant Candle's Heat Told and Accurately Recorded

So sensitive that it is said to respond to the heat of a candle placed several miles away, an instrument has been devised at

Dr. Coblentz, Expert Astronomer of the Bureau of Standards, and His "Star Thermometer"

the United States bureau of standards in Washington, D. C., to estimate the temperature of the stars. Valuable additional information concerning the heavenly bodies has already been obtained in experiments with the instrument at the Mount Wilson observatory, and it is regarded as an important aid to the telescope and the spectroscope in making astronomical observations.

Milk-Ticket Holder in Bottle Neck Saves Trouble and Breakage

Trouble and breakage, sometimes attending the removal of milk tickets from moist bottles, are avoided by a convenient holder for the paper slip. It consists simply of two small projections on the inside of the neck, just below the ledge where the paper cap fits, and between which the ticket is inserted. There it is held so securely, it is claimed, that it cannot blow away, will not fall out if the bottle tips over and sticks up so that the milkman can get hold of it easily.

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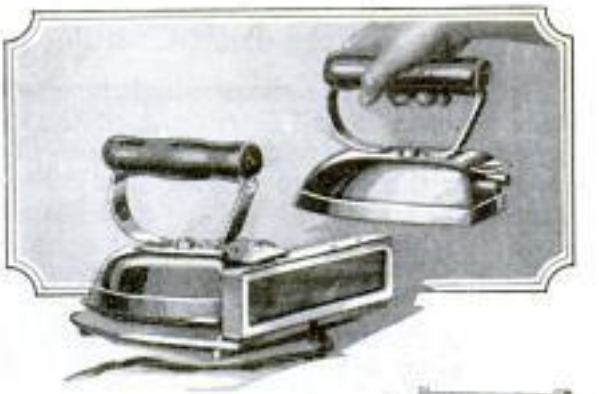
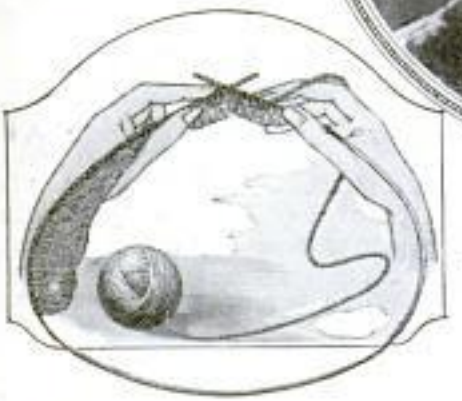
Time and Money-Saving Tools



Coat and Trousers Hanger, Shoe Rack, Brush Box and Drawer for Studs, Collars and Clothing Are Combined in Compact Dressing Chair for Men; Above, Heating Base for Electric Irons Eliminates Moving of Cord

Secure, Sanitary and Comfortable, This Adjustable High Chair Fits Children from Six Months to Six Years Old

Below, Flexible Cable with Steel Ends Takes Place of Two Knitting Needles and Prevents Dropping Stitches



When It Rains, This Waterproof Cover, Quickly Unfolded or Extended, Protects the Hat When an Umbrella Is Not at Hand

Washing Is Simplified with Revolving Electric Tub That Tilts

Clamped in a Sanitary Revolving Squeezer, the Toothpaste Tube Cannot Get Lost and Is Instantly Ready for Use by Turning Key

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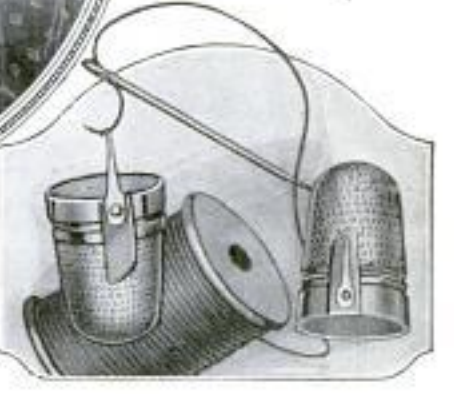
for Woman's Workshop in Home

Even Icing for Cakes Is Assured by Revolving Tin That Whirls Easily and Has Top and Bottom That May Be Used as Pie Pans; Right, a Compact Gas or Electric Clothes Drier Saves Space and Work

Fitted to Water-Pipe Cock, Hose Reel Is Practical and Convenient

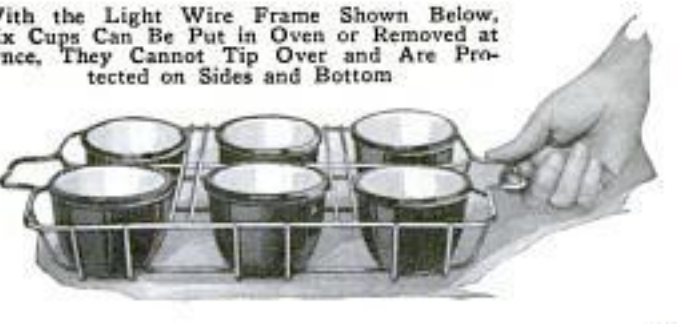
Bobbed Hair Is Said to "Stay Put" When This Combination Brush and Comb Is Used; There Are Stiff Bristles between the Teeth to Give Hair Sheen and Thoroughly Remove Dust

Adjustable Strap Holds the Small Child Securely to the Auto Seat



Attached to Thimble, a Needle Threader Saves Time and Trouble in Sewing. Cannot Get Lost, Is Always at Hand When Needed and Is Easily Held; It Folds Back Out of the Way When Not in Use.

With the Light Wire Frame Shown Below, Six Cups Can Be Put in Oven or Removed at Once, They Cannot Tip Over and Are Protected on Sides and Bottom



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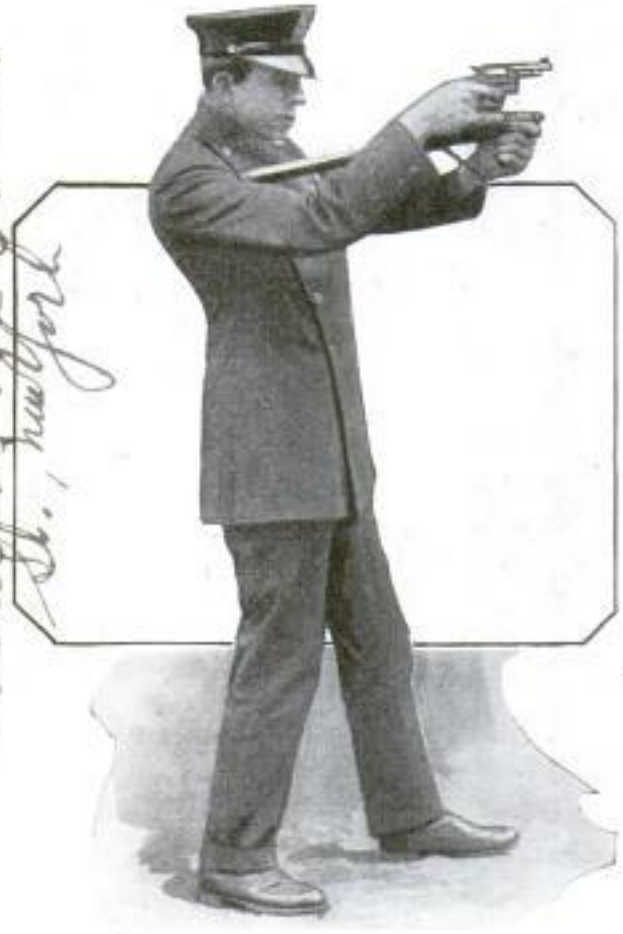
Pistol Slot in Night Stick Helps Policemen Shoot Straight

Police night sticks with a steel slot in one end to hold the revolver butt have



With Revolver Butt in Slot of Stick, Policeman Sights as He Would with Rifle

been tested by the New York department as an aid to accuracy in firing. Holding the club against one shoulder and putting the handle of his revolver in the slot, the policeman can take a steadier aim.

Shocking Steel to Improve It

To improve the quality of steel, an English inventor has developed a process to agitate the metal in its molten state by a series of explosive shocks. The treatment is given in the form of a mixture added to the glowing liquid mass. To obtain various results the charges are sometimes introduced at intervals, each being placed in the metal after the movement caused by a preceding explosion has ceased. Care is taken to keep the loads sufficiently light to prevent their scattering the material when detonation takes place. The shocking is said to add considerable strength to the metal without affecting the original content of carbon.

Silk Machine Is More Sensitive Than the Human Hand

So sensitive that it can detect unevenness in threads as slight as two-thousandths of an inch, a mechanical testing device on machines that wind silk from bobbins into skeins, is constantly on guard to catch flaws that might decrease the value of the woven fabric. It not only detects the imperfections but counts and classifies them. Its work is far more precise than any that human hand could do, and what it "feels" is visible to the human eye only with the aid of powerful microscopes. The detector consists chiefly of ten tiny grooves adjusted until a "feeler" of the above-mentioned thickness fits closely enough just to hold a weight. Any variation in the threads actuates the detector in such a way that the machine stops and the imperfect thread is broken off before it can be wound into the skein.

Mechanical Watchdog for Auto Set Off by Touch on Car

Known as a mechanical watchdog, a small device is being manufactured that immediately sounds a warning when any part of the car is touched. The slightest jar releases a wheel, each notch of which, as it revolves, makes a contact, causing a series of sharp toots of the horn. The force required to set the mechanism in motion is regulated by an adjusting screw. When the owner parks his automobile, he sets the switch, which may be secreted in any of a score of places known only to him. Any person trying to find it will have to touch the car, thereby sounding the alarm. It can be installed under the hood or seat, and raising either to cut the wires would start the mechanism. The same device can be used on garage doors, chicken coops or any other place needing protection from thieves, and may be equipped to give the warning by bells, lights or any signal electrically operated.

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1855 Cont. H. J. Wilkins. Esq.
-31. Heber Road,
Wandsworth Common S.W.
London, England.

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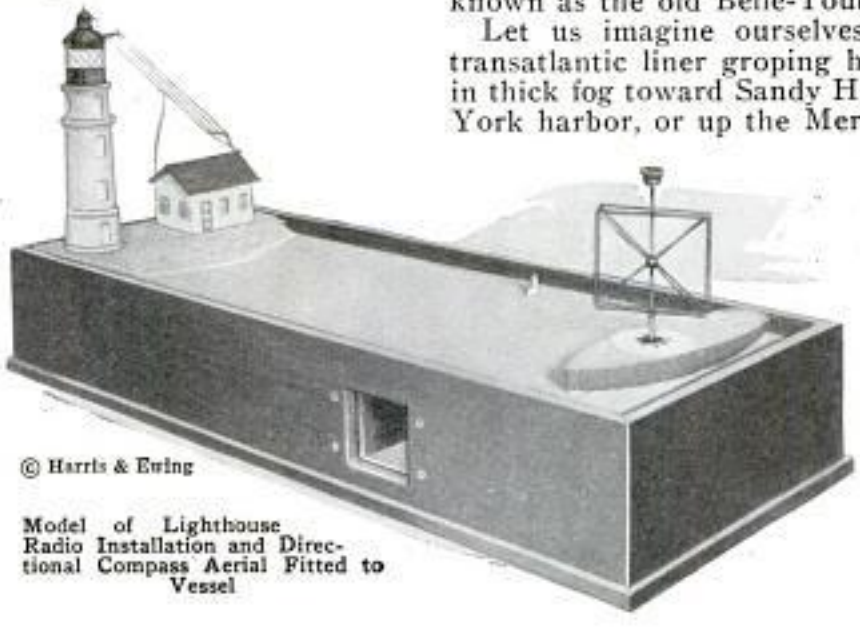
Apparatus for Receiving the Wireless Lighthouse Rays Installed Aboard the Steamship "Royal Scot" Whose Voyages Are Routed near Dangerous Shores from Which Caution Signals Are Flashed

Making World's Seas Safe for Ships

Radio Beacons and Direction Finders Lessen the Danger of Ocean Disasters

"LIGHTHOUSES without lights atop" may be the fate of the towering beacons of navigation after their centuries of service on rock-bound coasts. Radio already is displacing these lanterns of wind-swept seas and revolutionizing the lighthouse system. St. Agnes light on the southernmost rock of the Scillies is an example of what is happening to lighthouses in 1924. It has been converted into a holiday home by the earl of Orslow. Another disused lighthouse, now employed as a summer residence, stands seventy-eight feet high on the edge of the Sussex downs at Beachy Head, in the south of England. It is known as the old Belle-Toute lighthouse.

Let us imagine ourselves on a great transatlantic liner groping her blind way in thick fog toward Sandy Hook and New York harbor, or up the Mersey to Liverpool. The pilot stands, all nerves and anxiety, in the bridge house, burdened with the responsibility for the safety of the ship and many valuable lives and much property. Forward,



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Model of Lighthouse Radio Installation and Directional Compass Aerial Fitted to Vessel

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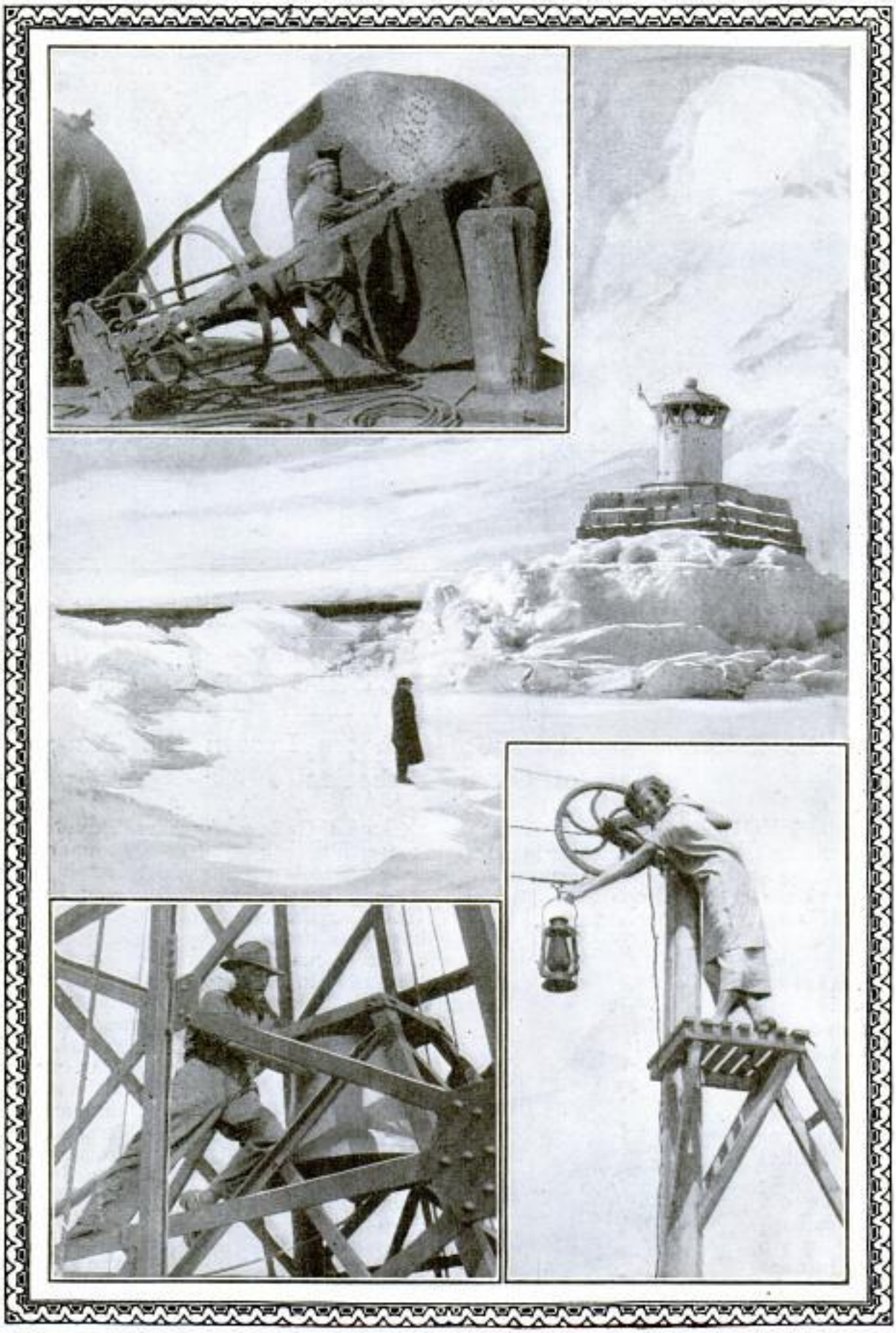

Above, Repairing Steel Buoy, and Icebound Lighthouse near Maine Coast; Below, Adjusting Floating Fog Bell, and Sending Guide Lantern to Its Place in Sea

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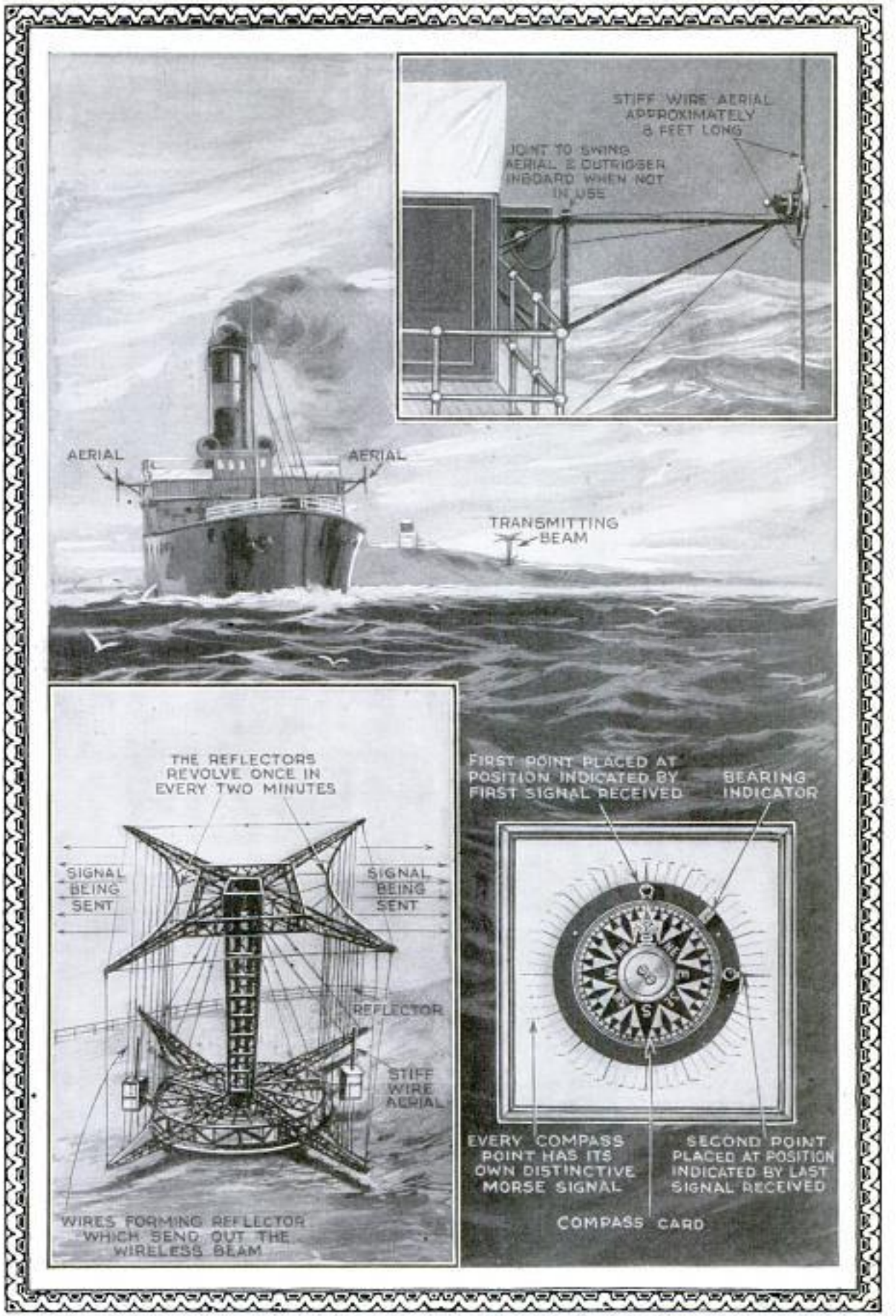

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Wireless Beam System as Applied to Guidance of Vessels off a Dangerous Coast Where Apparatus Clicks Out Its Warning Signals to Unseen Craft Far at Sea

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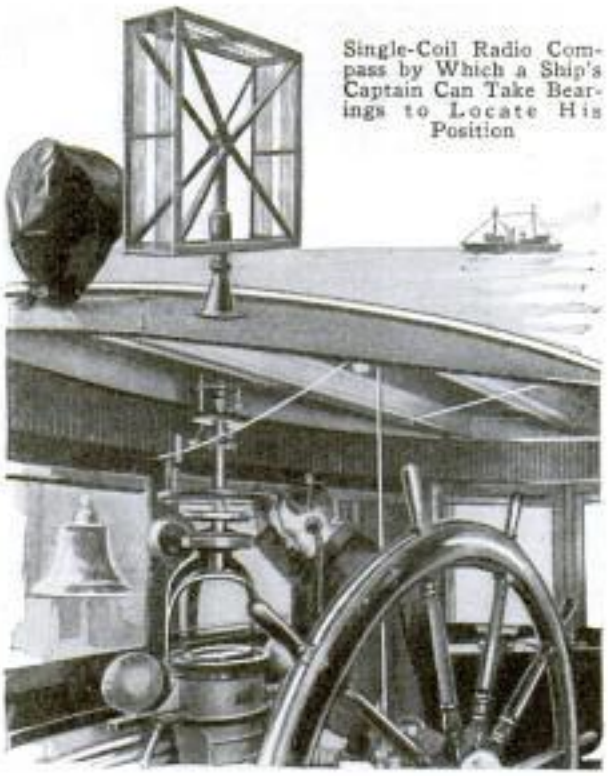

Single-Coil Radio Compass by Which a Ship's Captain Can Take Bearings to Locate His Position

the lookout man is telephoning his observations from a crow's nest. Time, more than ever, today, is money, and the great ship cannot drop her anchor and wait for the fog to roll away from the skyline. She is steaming ahead with the speed of a railroad train. The pilot now fastens a headpiece over his ears, grasps the wheel of the helm and fixes his eyes on the compass. A faint sound is heard in the receiver. Miles away, a land station is sending a radio message to the ship's bridge, across the curtain of wreathed fog, and the blind waste of waters outside the fairway. On top of the bridge house is a small antenna. It is shaped like a square frame, wound round with wire and pivoted on a base whereon it may be moved in any desired direction. A vertical rod connects the antenna with an arrow swung by wires above the face of the compass, and on the rod itself is set a small wheel which turns the antenna. The pilot now gently turns the wheel on the rod until the sound is sharp and distinct, which is when the wires of the antenna are in the same plane with the transmitting land station. Simultaneously, the arrow over the compass moves until it shows the direction from which the signals are coming. They are continuous signals not to be confused with shore radio messages. He takes signals from three stations, and plots three lines on a chart of the fairway and harbor, running from the radio stations in the directions indicated by the compass readings. The point of intersection of the three lines shows the position of the ship, which steams confidently ahead. True or magnetic bearings are essential to the navigator, but the direction finder furnishes relative bearings, referring to the direction of the ship's keel line and not to north and south compass points.

The action of the direction finder is dependent upon the exact position of its special aerial loops erected on board ship, and great care has to be taken to keep the loops rigid and constant, once that position and the size of the loops have been accurately adjusted. How is the essential true or magnetic bearing of the ship obtained? If the ship has a gyro compass, it is necessary only to mount a repeater card beside the direction finder, and the true bearing is obtained by direct observation.

Lighthouse Perched on a Barren Rocky Island on the Coast of Sweden

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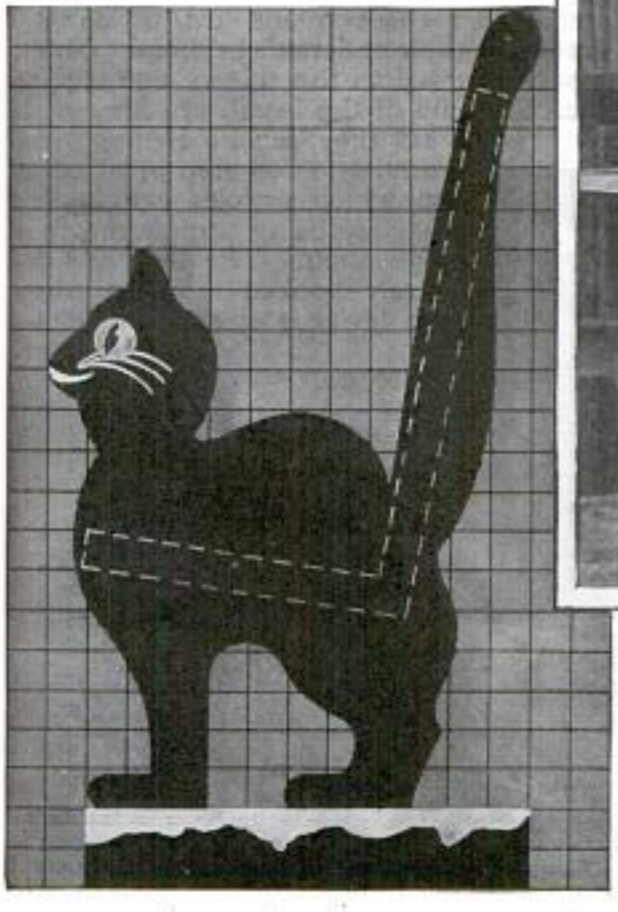
A Black-Cat Bench for Children

By H. C. McKAY

CHILDREN are always interested in bits of furniture that incorporate animal designs. My own children have a number of pet cats, so I determined to construct a small settee or bench based upon a cat design. After some search I found a design, which, with a little alteration, I thought would serve very well for this purpose. The drawing shows one endpiece of the settee drawn to scale. As my children are quite small, the scale I used is 1 in. for each division of the scale. It is very easy to enlarge this design to any desired dimensions. The tails of the cats support the back, so it is evident that the endpieces should be cut with the grain of the wood vertical. Also a fairly close-grained hardwood should be used. The endpieces were cut from ⅝-in. material, a common fretsaw being used for the purpose. A piece for the back was cut from ⅝-in. material, 14 by 24 in. in size. The seat measures 8 by 24 in., and was cut from ⅞-in. stock. These were inserted as shown by the dotted lines in the drawing. It will be noticed that the front of the seat is higher than the back and that the angle between the two is somewhat greater than 90°. As the feet of the bench were cut across the grain they were reinforced with two pieces, 1½



Left, Design of the Ends of the Black-Cat Bench, to Scale; Right, Photo of the Completed Bench

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in. square, nailed to the inside. To prevent splitting, the holes for the nails were drilled before nailing.

When all the material was ready for assembly, the back and seat were upholstered. The back had no padding. A piece of green-colored decorative burlap was fastened to the top edge of the back piece, the edges being turned under to make a smooth edge. This edge was fastened with small carpet tacks. The burlap was then stretched tight and tacked along both sides, but not turned over the edges. Finally the bottom was turned and tacked to the narrow edge of the back. Then, as a finish, gimp was nailed over all edges, using upholstering nails for this purpose.

The seat was next upholstered. Burlap was tacked to the bottom, about 1 in. from the edge, and gimp applied to provide a smooth edge. Next the ends of the burlap were drawn over the ends of the seat and fastened in like manner. The burlap was drawn firm but not stretched. When the three sides were fastened, curled hair was packed into the sack thus formed until it was about 1½ in. thick in the center, thinning out to all edges. Finally the back was drawn under and tacked to the bottom. The seat was then turned over and beaten with a lath until all lumps had disappeared and the hair was uniformly distributed.

In assembling, the back is inserted first and nailed into place. I used nails throughout so that they could be countersunk and puttied over. When the back had been placed, the seat was inserted so that the bottom edges of the back and the seat were flush. Then the seat was nailed in place.

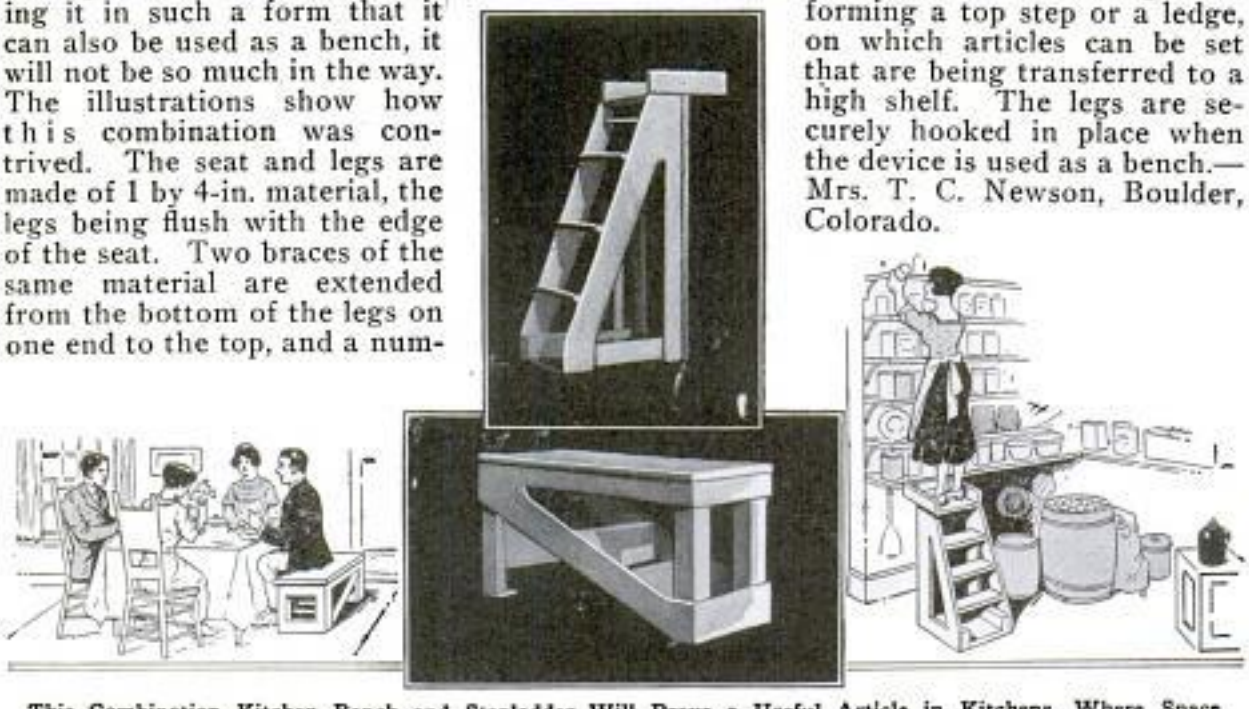
In finishing, the settee was given a coat of ordinary black paint followed by two coats of gloss-black enamel. When this was thoroughly dry, the eyes, mouths and whiskers were painted in white decorative enamel. An irregular band of white enamel was drawn just under the feet to separate them from the base proper. This settee has proved very popular with the kiddies, and they prefer it to any of their other chairs or seats.

The material required is:

2 pieces, 22 by 12 by ⅝ in., for the ends.
1 piece, 24 by 14 by ⅝ in., for back.
1 piece, 24 by 8 by ⅝ in., for seat.
2 pieces, 12 by 1½ by 1½ in., for base reinforcement.
Burlap, hair, paint, enamel, etc.

Combination Breakfast Bench and Stepladder

A small stepladder is a decided convenience in the kitchen and pantry, but limited space in most cases prohibits having one. However, by building it in such a form that it can also be used as a bench, it will not be so much in the way. The illustrations show how this combination was contrived. The seat and legs are made of 1 by 4-in. material, the legs being flush with the edge of the seat. Two braces of the same material are extended from the bottom of the legs on one end to the top, and a number of short boards fastened between the legs and braces to serve as treads of the stepladder; these treads are, of course, braced on their underside by small wooden blocks screwed to the sides. The legs at the other end of the bench are hinged so that they can be swung over, forming a top step or a ledge, on which articles can be set that are being transferred to a high shelf. The legs are securely hooked in place when the device is used as a bench.—Mrs. T. C. Newson, Boulder, Colorado.



This Combination Kitchen Bench and Stepladder Will Prove a Useful Article in Kitchens, Where Space Is Always More or Less at a Premium

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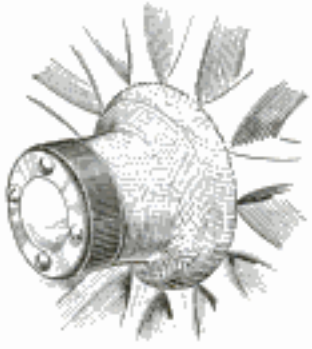
A Kink for Hunters

While on a hunting trip my supply of 12-gauge shells was exhausted. Unfortunately all the other hunters had 16-gauge guns, so I couldn't borrow any shells even if my fellows had had an oversupply. Rather than let my companions do all the shooting I decided to make shells, which I did in the following way: The metal base of a 12-gauge shell was cut away and a 16-gauge shell was placed in the hull, which it fitted exactly. This was then placed in the gun, care being taken to have the base of the shell flush with the rear end of the barrel so that the plunger pin could easily reach the primer, and I was soon shooting again. Plenty of 16-gauge shells were available and although it was troublesome to load and unload the gun, I did not miss all of the fun. When shooting at close range this method has its advantages, as the shot scatter much more than with the 12-gauge shells.—Bunyan Kennedy, McCool, Miss.

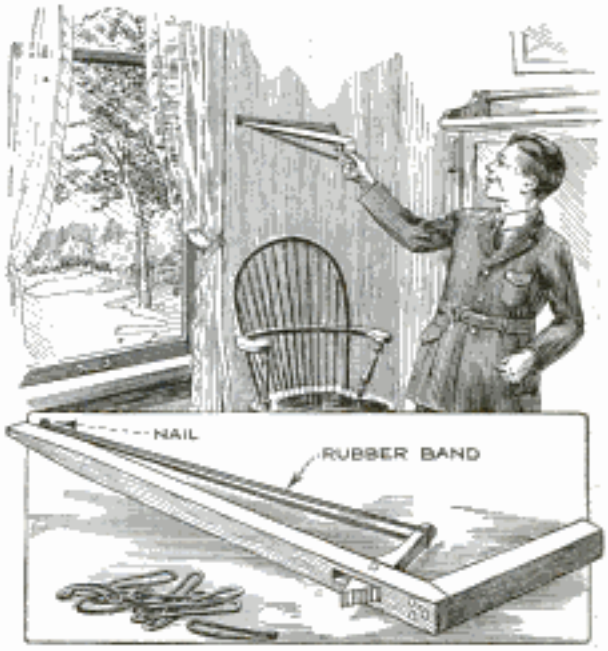
Dust Cap for Wagon Wheels

By providing a tin cap on the open end of the wheel hub, as shown in the illustration, dust cannot enter and the grease will be retained. The caps can be made of sheet iron cut to form a disk, the sharp edges being ground down if desired. The center may be dished a little to improve the appearance. Holes are drilled along the edge of the disk for wood screws, which are driven into the end of the hub to hold the disk securely.—H. H. Siegele, Emporia, Kans.



Magazine Pistol Shoots Rubber Bands

For shooting flies and other insects, or target practice, a simple repeating pistol of the kind shown in the illustration can be made by any boy. It consists of two lengths of wood, about ½ in. square, one serving as the barrel and the other as the stock or handle of the gun, these two pieces being nailed or screwed together as shown. A slot is cut in the barrel and a trigger is inserted and pivoted on a small pin driven through both. Six or eight small notches are cut in the end of the barrel and a corresponding number on the upper end of the trigger, which is beveled as indicated. A small tack or screw is driven into the underside of the barrel at the end and a fairly heavy rubber band is

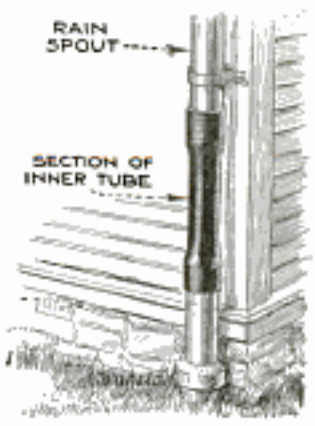


Toy Pistol for Shooting Flies and Insects That Can Be Made by Any Boy

stretched from the tack to the trigger to keep the latter cocked. Lighter rubber bands are stretched from the notches at the end of the barrel to the corresponding ones on the trigger. In use, the trigger is pulled back just far enough to release the top band. After it has been "fired," the second one is released in the same way, and so on until all are discharged.—Frank Patecek, Jr., Covington, La.

Emergency Repair for Rain-Water Spout

A rain-water spout which had rusted through and extended below ground, was repaired with a piece of inner tube as shown in the illustration. The rusted section was cut out with tin snips and the tube, which was a few inches longer than the cut-out section of the pipe, was fitted on securely. The tube was about ½ in. smaller in diameter than the pipe so that, after it had been pulled on, there was little chance of its slipping off.



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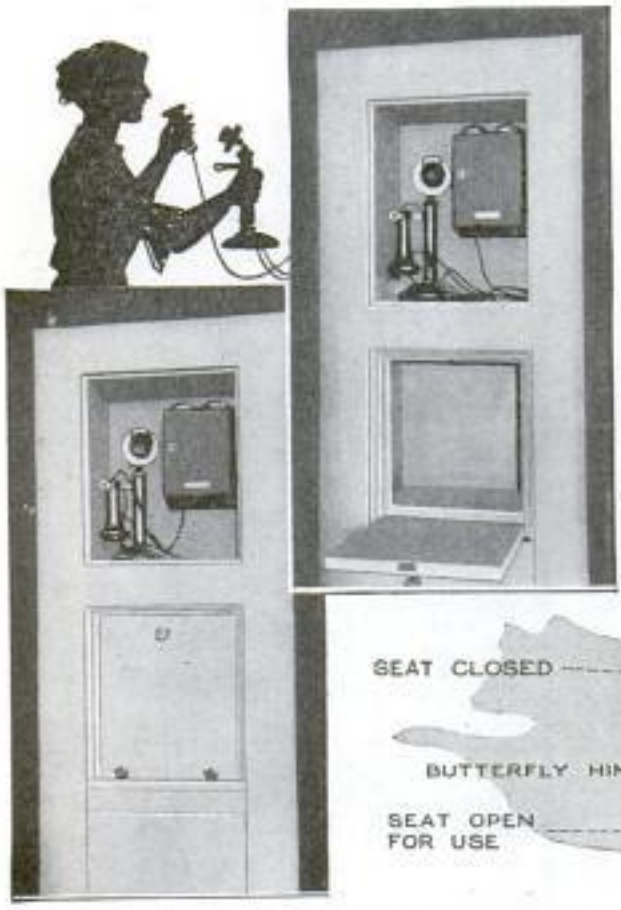
Homemade Telephone Cabinet

This combination hall telephone cabinet and folding seat was made by a home carpenter at a fraction of the cost of a ready-made cabinet. An open-front box was built, 33½ by 14 by 8½ in. in dimensions, with two compartments, and recessed into the wall at a point where it extended into a closet on the other side of the wall, bringing the bottom of the box in this case 18 in. above the floor. For the seat, a 1 by 12 by 20-in. board, surfaced on sides and edges, was used. It was hinged to a rail about 14 in. from the free end of the seat, so that, as the 14-in. part of the seat descends, the concealed 6-in. length of the board moves upward until it rests firmly against the underside of the floorboard of the locker. Added pressure on the seat only causes it to press upward more firmly. In a vertical position, the seat closes the opening of the locker; it should be recessed about 1½ in. so that a glass knob, which is used as a handle, will be flush with the casing. The cabinet is finished with a 4-in. casing and lower panel to match the woodwork of the room, and a strip of the same width separates the two compartments. The locker contains telephone directories, pencil and pad.—A. May Holaday, San Jose, Calif.



Combination Telephone Cabinet and Seat Built in Wall Proves Convenient and Space-Saving Feature

Renewing Plush Coats

With the first cool days of fall plush coats that have been stored away for the summer are brought out and they usually are wrinkled to such an extent that they must be steamed and brushed to restore the set of the nap. This can be done in the following way: Place the garment upon a hanger and suspend it over the bathtub. Allow hot water to flow from the faucet into the tub so that steam will envelop the garment. After ten or fifteen minutes of steaming, the coat should be brushed with a fine brush and left on the hanger until entirely dry. The time necessary for steaming will vary according to the temperature of the room. The coat should be allowed to become warm before steaming, for, if the coat is cold, the rising steam will condense upon it, wetting the nap and making it difficult to restore it to its former luster.—G. E. Hendrickson, Argyle, Wis.

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Thawing Water Pipes

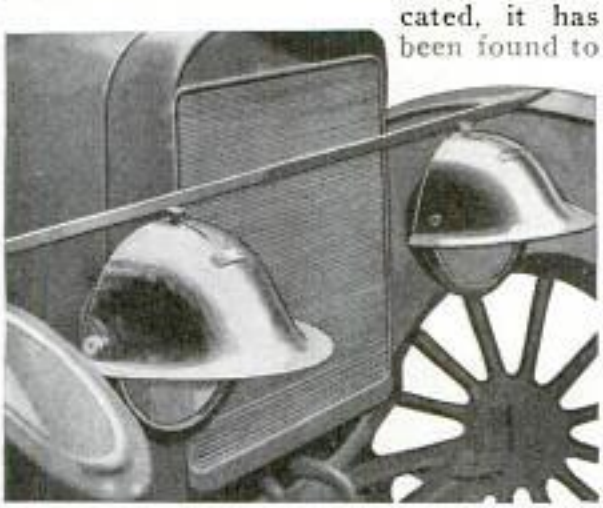
After several fruitless attempts had been made to thaw out a frozen water pipe by pouring hot water on it, the use of lime was found very effective. The water pipe extended through the floor and into the ground, and there was a space around the pipe to a depth of about 5 ft. About a peck of lime was thrown into this space. After a small pailful of water was added the heat created by the lime was so great that the water in the pipe was running two minutes later.

Testing Radiator Solutions

Many hydrometers for measuring the concentration of alcohol in radiator solutions are not very dependable. A good method of testing their accuracy, or entirely dispensing with their use, is to fill a small bottle or test tube with the liquid. This is placed in a jar containing a mixture of snow and salt. A thermometer is placed in the radiator liquid and the temperature at the freezing point read. The writer had the solution of his radiator tested with a hydrometer and was told it would freeze at 10° below zero, but it actually froze by test at 20° above.—J. M. Blair, Boulder, Colo.

Novel Antiglare Shields

The photograph shows another use for the old steel helmet. Cut in half as indicated, it has been found to



Glare Shields for Auto Headlights Made from Old Shrapnel Helmet

make an excellent glare shade for auto headlights. Thumbscrews at the top and sides permit adjustments. When nickel-plated, these shades look well.—J. R. Schmidt, Hyde Park, Cincinnati, Ohio.

New Use for Vacuum Cleaner

Finding it too laborious and tedious a task to get rid of the potato bugs in his patch by picking them off, an amateur

Electric Vacuum Cleaner Used to Clean Potato Patch of Bugs

gardener hit upon the idea of using a vacuum cleaner. The method proved very effective and now, he claims, he can clean the whole patch in half an hour.

Renewing Light Reflectors

When the inside of a metal electric-light shade becomes dull and no longer reflects the light well, the usual method of renewing the surface is to cover it with aluminum paint or white enamel. The former does not last long and the latter turns yellow and cracks, so that the treatment must be repeated quite often. To refinish the inside of the shade so that it will give satisfaction both as to length of service and reflection of light, line the inside with tinfoil. This may be obtained at a florist's for a few cents. Cut the foil about 1 in. larger than necessary to cover the inside of the shade, crinkle it to make the surface as rough as possible and fasten with hot glue. The crinkled foil makes a reflector that will dazzle the eye.—Geo. L. Michel, Jersey City, N. J.

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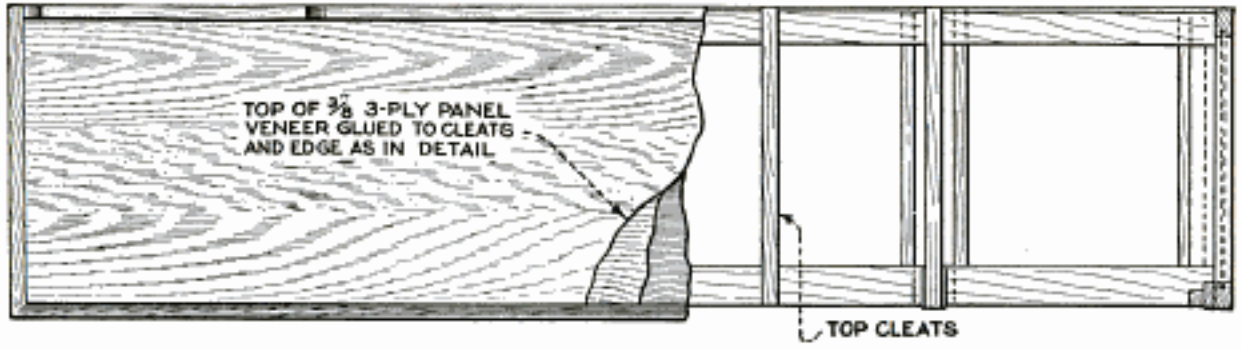
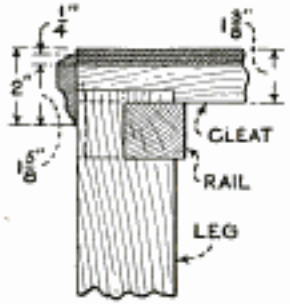
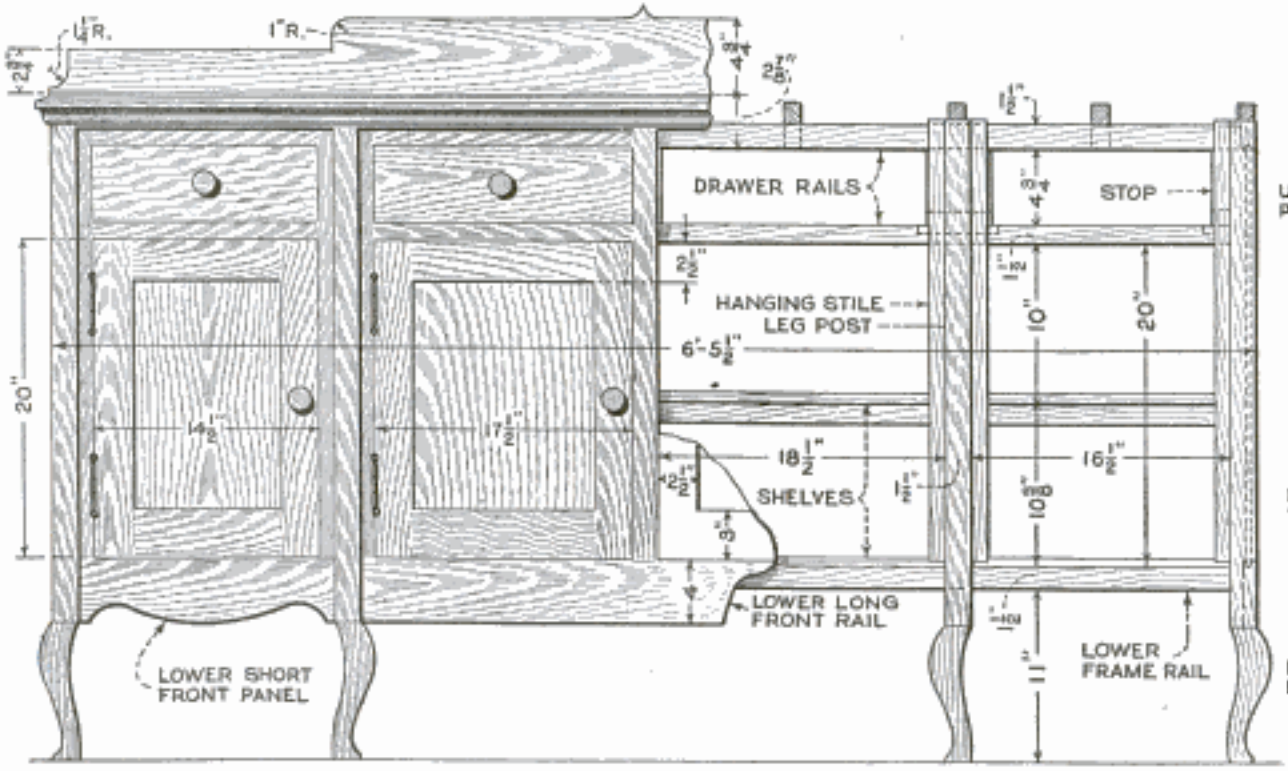




DETAIL OF NOSING

Plan, Side and End Elevations of the Portable Buffet, Together with Details of the Framing, Doors, Panels, Ornamental Top and Nosing; This Job Is Easily within the Powers of the Amateur



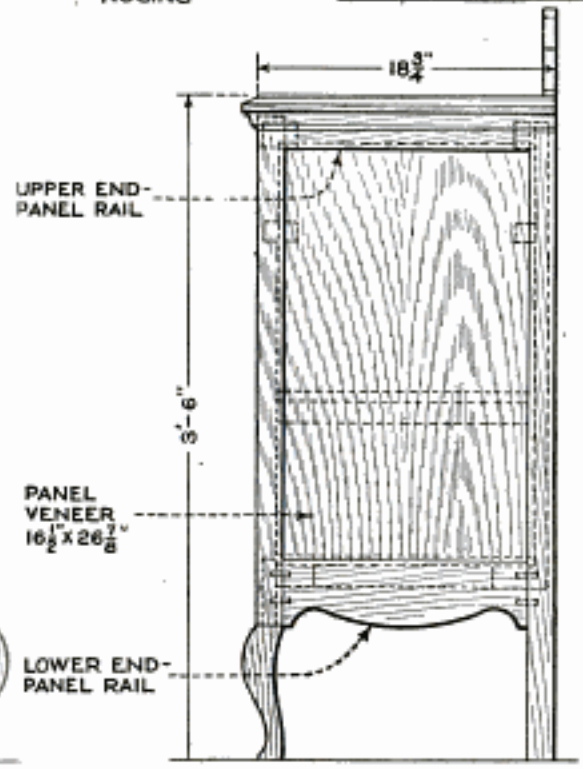


FIG. 1

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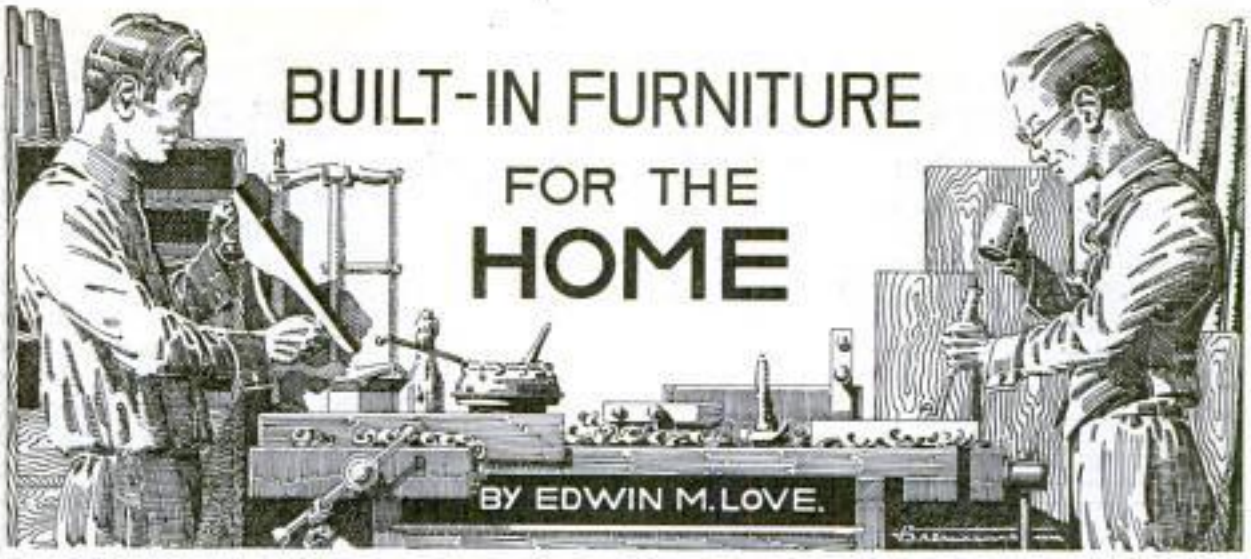

Part II—A Portable Buffet

FINISHED to match the inside trim of the house, the portable buffet is now much in favor in the modern home. And being portable, it is as easily added to the old house as the new. Any skilled home mechanic should be able to build the handsome buffet illustrated by the photograph. It is 3½ ft. high, 6 ft. 5½ in. long from post to post, and 1 ft. 6¾ in. in width. By keeping the widths of the doors in the same proportion as those in Fig. 1, the buffet can be shortened 1 ft. without greatly lessening its beauty.

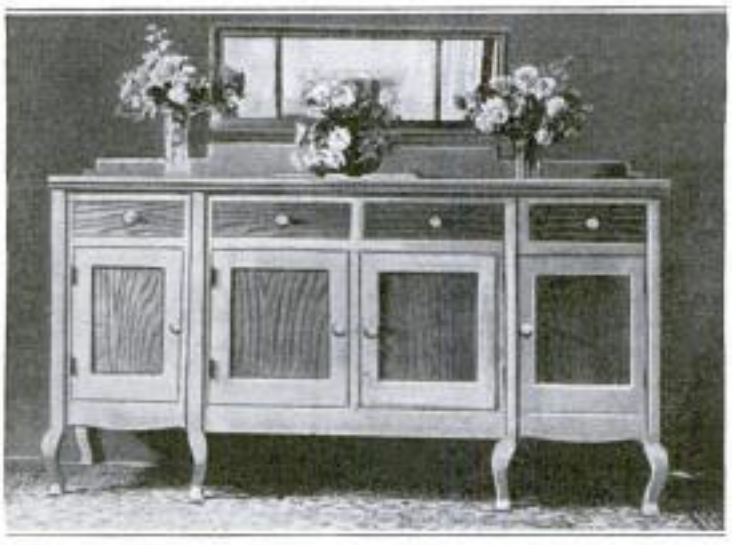

Photo of the Completed Buffet, a Very Handsome Piece of Furniture for the Dining Room

Using pine or fir, 2 by 3-in. stock, sanded on all four sides, sized to exactly 1½ by 2⅝ in., make the two drawer rails as dimensioned in the detail, Fig. 2. The inside notches mate with notches in the leg posts, housing the hanging stiles and making rigid joints, while the irregular profile of the ends fits around the stiles of the corner posts and against the panel veneer of the ends of the cabinet. Coat all end wood with liquid glue, for sizing, and allow it to dry. As the bottom front rail is below the hanging stiles and is set back 1 in. to form a backing for the ornamental lower front panels, as shown in the elevation and the details of the rail and stile joints, the notches are narrower than those in the drawer rails. The joints formed do not show, but must be accurate to insure rigidity. The two back rails, as detailed, are much like the bottom front, as there are no hanging stiles on the rear legs. These rails form a backing for the panel-veneer back, and are set ⅜ in. from the rear of the posts.

The front center leg posts, shown in Fig. 3, are 3 ft. 5⅛ in. in length, of the same 2 by 3-in. stock as the rails. Select the best edges and mark them "F" for face, and ¼ in. from this face plow a 1-in. groove in each side, ¼ in. deep, to house the stiles. These grooves are exactly 2 ft. 4½ in. long, and of constant depth. After grooving, cut the notches and square the lower ends for a distance of 8⅞ in. Glue and nail in the grooves stiles made by ripping 1⅛ by 3-in. stock down the middle and sizing to 1 by 1¼ in. Wipe off all surplus glue and sand carefully. Assemble with the three front rails, as detailed in Fig. 5, gluing the joints and driving through from the back two eight-penny box nails in each. With snug fits, great care must be taken to avoid splintering or bruising of the front corners.

The rear center posts are plain except for the two rail notches shown in the

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drawing and the tapered shoulder above the squared leg portion. Assemble these with the back rails by means of two lower shelf cleats, as detailed in Fig. 4 (which lap underneath the lower rails, flush

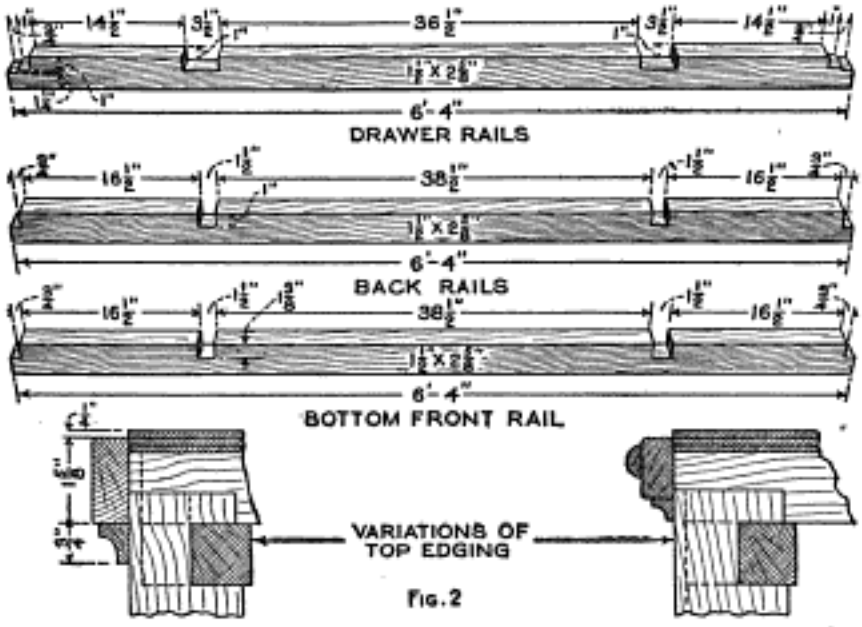

Fig. 2

with the top, and bear against the sides of the posts nearest the ends of the cabinet) and two similar cleats of 2 by 3-in. stock nailed to the tops of the posts, projecting above their upper ends ¼ in. Toenail these solidly with six-penny finish nails. Square this assembly and set aside to dry.

The lower end-panel rails, Fig. 4, are 4 in. wide by 1 ft. 3¾ in. long, and 1 in. thick. Groove the face edges, ⅜ in. wide by ⅜ in. deep, ¼ in. from the face side; bore ⅜-in. dowel holes, 1½ in. deep, 1 in. from each edge in the ends, and lay out on one a series of 1½-in. squares to allow accurate transferring of the curve from a full-size drawing to the piece. Saw to shape with a compass saw, or make a number of saw cuts in the waste wood, rough out with a chisel, and finish with spokeshave and wood rasp. Use this as a pattern for the other rail. The upper rails are 1 by 2½ in. net, 1 ft. 3¾ in. long, grooved for the panel veneer and drilled for dowels.

Make the front corner posts in pairs out of 2 by 2-in. stock, grooving one side for the panel veneer and one for the hanging stile, as shown in the detail, Fig. 3. The rear corner posts are also made in pairs, but are grooved only for the panels. Lay out for dowel holes so that the lower edge of the lower rail comes 8⅞ in. from the bottom end and the upper rail ½ in. above the top of the post. Cut the panel veneer (with grain running vertically) 16½ by 26⅞ in.; bevel the edges slightly, and assemble the end panels for trial. If the joints are good, glue them together.

Cut a piece of 1 by 12-in. pine or fir 6 ft. 7 in. long, joint one edge straight, and slip into position as the bottom shelf, the straight edge against the back legs. Scribe the edge to fit the posts, notch it, and replace. The edge should come flush with the rails. Remove, and repeat with a length of 1 by 8-in. stock, fitting it against the front posts and keeping the edge flush with the backs of the stiles. Remove this board, replace the wide one, put the narrow one in position over it, and scribe along the back edge. Rip the 12-in. board to this line, joint, and nail in place. Spread glue on the front edge of this board and on the rear edge of the 8-in. board, and nail into place. Drive several ½-in. corrugated fasteners into the shelf from underneath. For partitions, square up four rectangles of 1-in. stock, 9¾ in. wide by 1 ft. 5⅜ in. long. Hold one against the end sides of the center posts and scribe to the bottom shelf, taking off ⅛ in. and afterward nailing solidly in place. The rear end forms a backing for the veneer, and

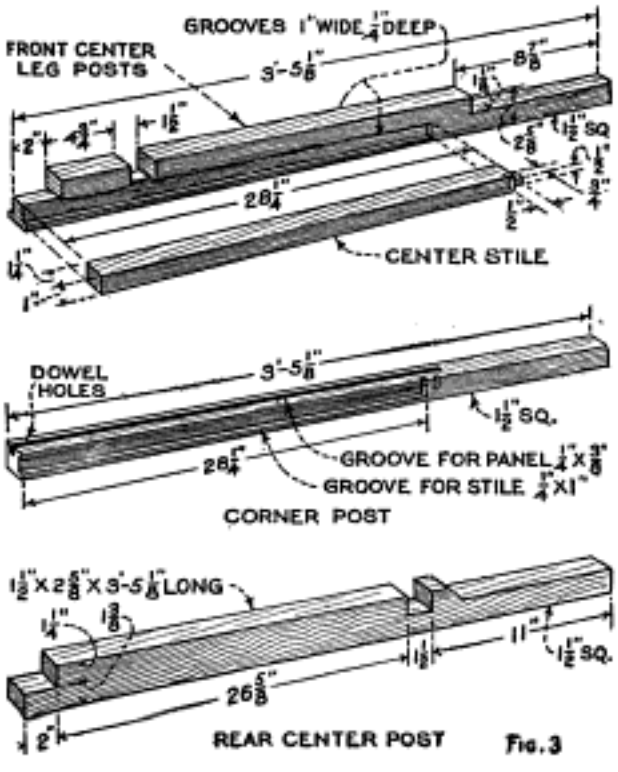

Fig. 3

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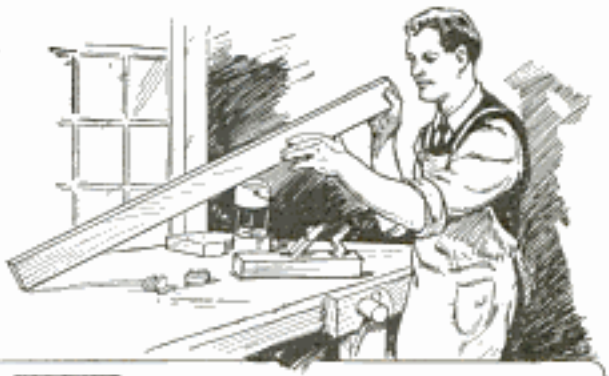
the upper edge a cleat for the upper shelf. Place the other partitions and install the upper shelf. Square the ends of the shelves, making suitable allowance for fitting against the panel veneer of the ends, and carefully place the end panels in position, marking the insides for shelf cleats. Using nails short enough not to project through to the face sides, nail and glue the cleats on, and assemble the end panels with the frame. Nail all joints from the inside and the ends of the shelves to the cleats.

Make the lower short front-panel rails, Fig. 4, of 1 by 4-in. net stock, fit them carefully between the leg posts and against the ends of the stiles, and nail through the center posts with three eight-penny box nails. Toenail into the corner posts and lower rail from the back and bottom edges.



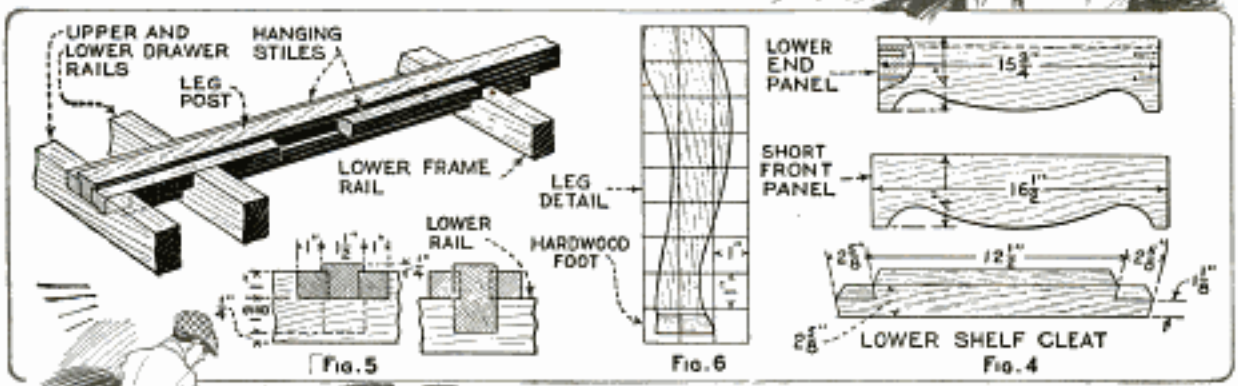
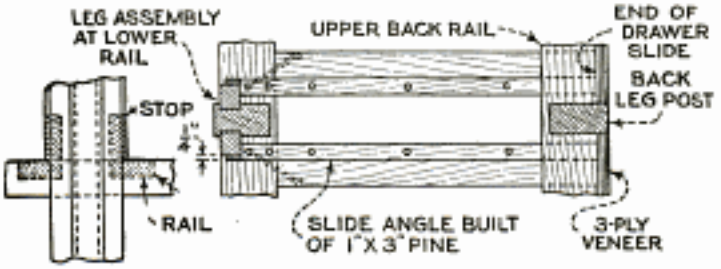


Fig. 5 Fig. 6 Fig. 4



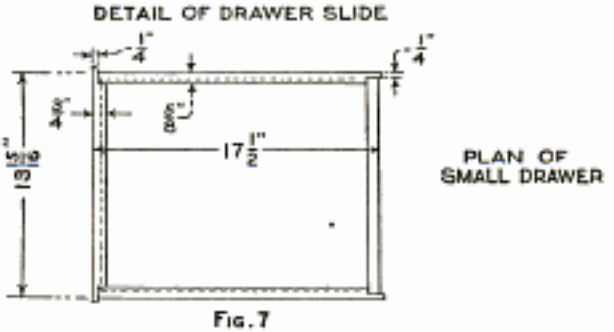


Fig. 7

If dimensions are followed, the shelf should project ⅜ in. above the rail, forming a stop for the doors. Place the long rail next. Make the center stile, cut a mortise in the lower rail to receive the tenon, and notch the stile into the rails.

Turn the buffet upside down and glue pieces of 1⅛ by 3-in. stock on the sides of the posts to provide stock for the curves of the legs, and when thoroughly dry lay out the side curves of all end and front posts, using a cardboard template. Cut the curves, lay out the front legs for the curve to the front, and finish the carving. Stand the buffet on a level floor, scribe the legs ⅝ in. up, turn it upside down again and cut to the lines. Replace the material removed by hardwood blocks, ⅝ in. thick, with the grain running lengthwise of the buffet. Carve these for the feet (Fig. 6).

Put on the veneer backs, tacking window stops to the posts where backing is necessary. Install drawer slides as indicated in Fig. 7, and put in the upper-shelf partitions. Put on the rest of the top cleats, line them with each other by means of a straightedge, and spread thickly with glue. Lay the 20 by 7-ft. panel veneer in place, secure it in two or three places with brads, and weight down until the glue is set. While drying, make the four panel doors, surfacing them down to a thickness

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of 15/16 in., and build the drawers, making them of the flush type, and allowing 1/16-in. clearance in width and height. The top cleats, coming flush with the upper rail, prevent the drawers from sagging when open. Leave the ends of the fronts long to allow of individual fitting to the openings. Rip the top veneer to width and joint it carefully. Miter the moldings around, gluing and nailing to the posts, leaving a 3/32-in. margin on the edge to conceal the center ply. Hold the ornamental back in place by three cleats, housed into it and the upper rail, and nail through the veneer from underneath to insure a tight joint.

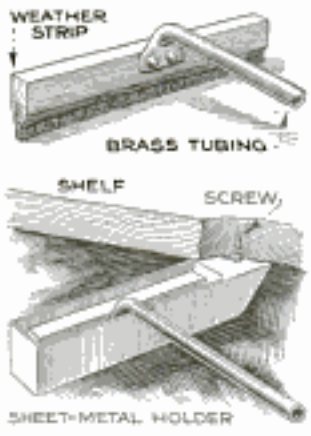
Before painting or staining, examine carefully for scratches or rough places, and sand thoroughly with No. 0 sandpaper. Very good effects are obtained by a combination of paint and stain. The buffet illustrated was painted with green-tinted gray enamel, with top, door panels, end panels and drawer fronts stained green-gray and finished with flat varnish. Four coats of paint should be used.

MATERIAL LIST

4 pieces, 2 by 3 in. by 10 ft., pine or fir, S4S, sanded.
1 piece, 2 by 3 in. by 12 ft., pine or fir, S4S, sanded.
1 piece, 2 by 2 in. by 14 ft., pine or fir, S4S, sanded.
2 pieces, 1 by 12 in. by 8 ft., pine or fir, S4S, sanded.
2 pieces, 1 by 8 in. by 8 ft., pine or fir, S4S, sanded.
1 piece, 1 by 6 in. by 8 ft., pine or fir, S4S, sanded.
3 pieces, 1⅜ by 3 in. by 10 ft., pine or fir, S4S, sanded.
1 piece, 1⅜ by 3 in. net by 6 ft., pine or fir, S4S, sanded.
1 piece, ⅜ by 4 in. net by 10 ft., pine or fir, S4S, sanded.
1 piece, 20 in. by 7 ft., three-ply fir panel veneer (top).
1 piece, 18 in. by 5 ft., three-ply fir panel veneer (end panels).
1 piece, 30 in. by 7 ft., three-ply fir panel veneer (back).
1 piece, 24 in. by 4 ft., three-ply fir panel veneer (door panels).
2 pieces, 1 by 3 in. by 12 ft., pine or fir, S4S, sanded (drawer slides).
1 piece, 1 by 6 in. by 16 ft., (plain drawer front).
1 piece, ⅜ by 4 in. net by 6 ft., (drawer back).
1 piece, ⅜ by 6 in. by 12 ft., (drawer sides).
2 pieces, ⅜ by 6 in. by 12 ft., (drawer bottom, tongue and grooved).
1 piece, ⅜ by 1 in. by 10 ft., (round-edge window stop).
1 piece, top-edge molding of chosen design, 10 ft. long.
2 oz. ¾-in. wire brads.
2 lb. six-penny finish nails.
¼ lb. four-penny finish nails.
½ lb. eight-penny box nails.
4 pairs 2½ by 2½-in. loose-pin butt hinges, to match house hardware.
8 1⅜-in. glass drawer pulls.
4 ⅜-in. friction catches.
Cost of materials, about $18.
Time to build, about 48 hours.

Keeping Auto Windows Free from Moisture

Cleaners attached to the windshield are effective in keeping a small area of the glass clear of rain and snow, and are of great assistance to the driver. However, in a closed car, it is often of equal importance to be able to see through the side windows, and the windshield wiper is of no help in this. A simple method of keeping snow, rain and moisture from clouding the windows of the closed car is shown in the illustration. A wiper, 10 in. long, is made from a length of weather strip, such as used for doors and windows in the house, and a small handle, made from a piece of brass tubing, is attached to it. A small tin trough is made to hold the wiper and the cleaning solution and fastened to the underside of a shelf in the garage. The solution is composed of glycerin, 2 oz.; water, 1 oz., and common salt, 1/16 oz. The wiper is kept in the trough, filled with this solution, and to prepare the glass for rain or snow, the wiper is stroked down the windows in the normal direction of rainfall. It is a matter of but a few moments to go over all the glass in the car before leaving the garage on a rainy or snowy day, or when the weather is threatening, and the driver then has the assurance that the moisture will not collect in drops on the glass and dim his vision.



Preventing Oilcloth from Cracking

A good method of preventing oilcloth from cracking, when it is used on shop tables or counters, is to first cut a paper cover for the table on which to place the oilcloth. The paper should be well oiled with common machine oil and placed smoothly on the table to be covered. The oilcloth is then smoothed out over the paper and stretched tightly. The oiled paper tends to keep the underside of the cloth moist, which prevents cracking, and the cloth will wear much longer because the paper acts as a pad.

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Winter Tug-of-War, Played with the Rope through a Snowbank, Is Healthful and Exhilarating Sport

Slicing Vegetables

For quick frying, potatoes should be sliced rather thin. This can easily be done with the aid of a slicer of the kind shown in the illustration. It consists of a paring knife and a wood screw, about 1¼ in. long. A hole is drilled in the end of the knife blade and made square with a small three-

Handy Potato Slicer Made from Paring Knife and Wood Screw

cornered file, and the shank of the screw above the thread is also filed square to fit this hole. After the potatoes are peeled, the screw is slipped through the hole in the knife and then driven into the potato. Turning the knife drives the screw farther in while the knife cuts a thin continuous slice. This method does not take longer than any other and the potatoes will fry thoroughly in a few minutes. The knife is not spoiled for other service as the hole does not interfere in any way.—Dale R. Van Horn, Walton, Nebr.

¶Windows and mirrors can be cleaned effectively with thin, cold starch, which is wiped off with a soft cloth after being allowed to dry thoroughly.

Winter Tug-of-War

When there is plenty of snow on the ground a variation of the tug-of-war game —"topple wall"—will prove a healthful and exhilarating sport. It is played in the same manner as the ordinary game but the object of the contestants is not only to pull the opposing boys off their feet but to drag them through a wall of snow built between them and through which the rope is run. To enable the wall to be pulled over, two perforated blocks of wood, about 1 ft. square, are provided in the middle of the rope and 8 ft. apart. They are fastened in position by means of pins pushed through knots in the rope, one on each side of the blocks. The wall of snow is first built up about 3 ft. high, then the rope is laid over it, with one block on either side, and the wall completed.

Rolling Cover for Outdoor Tables

Lunch tables left out in the open often become weather stained and otherwise soiled so that one dislikes to cover them with a clean linen tablecloth. This objection can, however, be overcome by providing a curtain roller of the ordinary kind on one side of the table, and fastening a piece of oilcloth to it as shown, so that the latter can be pulled over the table whenever it is used, and the linen then spread over it. The free end of the oilcloth is hemmed over to hold a steel rod so that the wind cannot blow it off.

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Washing the Car

When washing cars care must be taken not to get any water under the hood on the engine, for if it gets on the distributor, coil, generator or wiring, trouble may be

Piece of Tarpaulin Provided over the Hood Prevents Soaking Parts of Electrical System

experienced in starting the engine. A good method of preventing this trouble is to cover the hood with a large piece of tarpaulin or other waterproof material. The water can then be sprayed against the car without wetting parts of the electrical system. Washing the hood can be done afterward by hand.—G. A. Luers, Washington, D. C.

Fastening Wire Trellis to Brick Wall

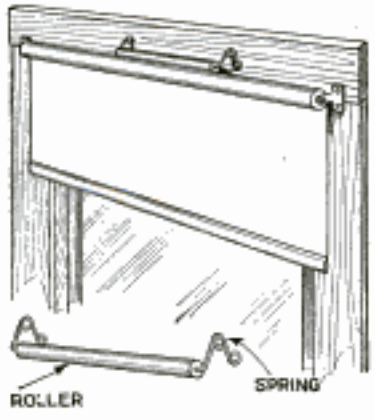
Often a vine has not the natural ability to cling to stone or brick walls, and a suitable trellis must be provided to support it. A wire trellis can easily be attached to such a wall by using screw anchors, which fit into holes drilled for them and expand under the pressure of the screw. Staples may also be used in walls laid in mortar. A 5/16-in. screw anchor will hold an ordinary fence staple, and requires a 7/16-in. hole. After the staple has been placed over the wire its ends are pinched together and driven into the anchor socket. The staple will then be held firmly and will support a considerable load. The trellis is first fastened to the wall, at the top. A chalk line aids in setting the wire straight. If carefully done, the trellis will hardly be noticeable.

A Blackboard for Children

A good blackboard for children can be made from a window shade mounted on the roller. Cut it to about 3 ft. in length, hem the lower edge and insert the stick in the hem in the usual manner. Procure some black slate paint and apply this to the shade on one side, giving it two coats, allowing sufficient time for the first coat to dry before applying the second coat. A blackboard of this kind is strong, and is very handy if attached to the wall with the shade fixtures, as it can then be rolled out of the way when not in use.

Auxiliary Roller Saves Window Shades

In homes, offices and shops, there are usually a few window shades that receive such constant usage that they are worn out while the other shades are still in good condition. This is mainly due to the fact that the shades are pulled toward one side or the other when raising or lowering them, and consequently the edges, rubbing against the brackets, soon become ragged. This common trouble can easily be prevented by providing a small auxiliary roller above the shade, as shown in the illustration. It is mounted in two brackets, made from spring wire, bent as indicated and screwed to the window casing. The roller itself is a short length of round wood such as a broom handle. The springs provide enough pressure between the rollers, to prevent the shade from running up or down unevenly.—G. E. Hendrickson, Argyle, Wis.



Marking the Water Line

Anyone who has attempted to stripe a water line around a boat has probably learned through bitter experience that this is an expert's job, if done without mechanical aid. A simple method of doing the job is shown in the illustration.

The boat is first put in the water to mark where the line should be when an average

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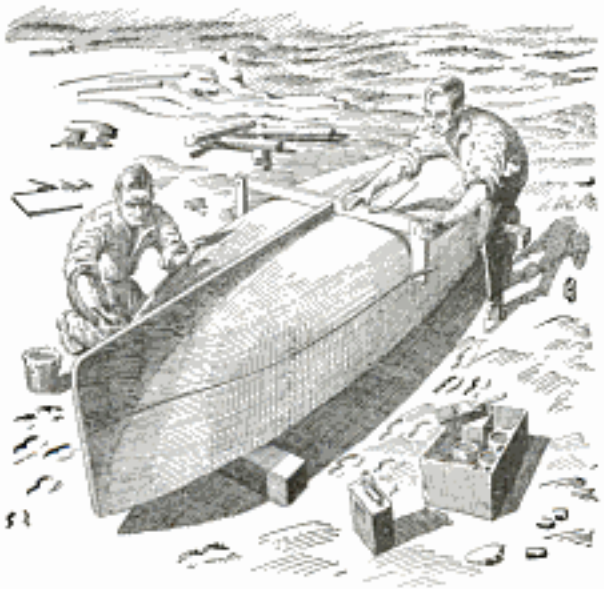
load is carried. This can be done with a piece of crayon while a couple of assistants steady the boat. The boat is then hauled up on the beach and turned upside down. A marking guide, consisting of a long wooden crosspiece mortised to fit the keel snugly and two vertical members, one nailed at each end of the crosspiece, is then made and set in position on the keel. Pencil guides, which may be common staples fitting the pencils snugly, are then attached to the vertical members so that the pencils, when pushed in against the hull, will strike the crayon marks on each side. As there is considerable curve in the length of the hull of the average boat it is necessary to use lengths of round wood, fitting the pencil guides and having the pencils lashed to the ends, or better still, lengths of brass tubing in the ends of which the pencils may be forced; this enables the pencils to be gradually pushed in as the marker approaches the bow and stern and keeps the line parallel to the keel. It might seem as though the vertical members could be pivoted to the crosspieces, and the pencils be fastened to them and simply swung in as the marker is moved along. This, however, will not produce a line parallel to the keel, but one that curves downward (toward the keel) at the bow and stern. At the latter points, if the keel curves so as to throw the line



Simple Method of Marking an Accurate Water Line on a Small Boat

off, the line can easily be completed by means of a yardstick.

¶Flowers, which are placed in vases for display, will last much longer if the leaves that extend below the surface of the water in the vase are removed.

Hog Catcher and Holder

It is usually a difficult task to catch and hold a hog, especially if it is a large one. However, a device can be made from a

Catching a Hog with Simple Device That Enables One Man to Hold It

broomstick and a length of wire with which one man can hold any hog with ease. Two small holes are drilled diagonally, at one end of the stick, so that they come through the surface about 2 in. from the end. A strong, flexible wire is run through the holes to form a loop, one end of the wire being knotted or fastened to the stick, while the other is left loose, and has a small handle fastened to its end. The hog can be easily caught at feeding time by slipping the loop over its upper jaw and drawing the wire tight.—Robert H. Neill, Ottawa, Ohio.

Making Candles Last

When candles are burned part of the wax is wasted by running down the side of the candle. By preventing this drip almost all of the wax will be used up and the candle last much longer. Shellacking the candle will do this. The candle is held by the wick and dipped into the shellac two or three times. The shellac forms a thin coating around it, and as this coat does not melt so easily as the wax, it forms a cup at the burning end, which holds the melted wax until it is almost consumed.—Walter C. Michel, Jersey City, N. J.

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Evergreens Preserve Christmas Spirit

By DALE R. VAN HORN

MOST of the Christmas trees sold by dealers are the tops of large trees salvaged for the Christmas trade, and there is no way of preserving them after the holiday season. But you who have access to small evergreens, why use the mere top of a tree? Why not expend a little time and energy before Christmas and obtain a small tree complete? Then, later, the tree can be set out in a chosen spot in the garden, where it will not only beautify the surroundings, but preserve the memory of the time when the children were little ones.

The idea is not a new one. Germany has long practiced the custom, and it is a splendid form of tree conservation. The idea is gaining favor in this country, and some day it will no doubt be possible to buy our Christmas trees, roots and all, carefully packed in wooden tubs, from the same dealers that now supply us with tree tops alone. In the meantime, of course, we will have to forage for ourselves.

The procedure is not at all difficult, provided the plans are laid long enough in advance. Take the experience of Mr. Harry Forney, of Lincoln, Nebr. In his own words, "the first step is to select the location in which the tree will be planted after it has been used at Christmas. On our place it is no particular problem, as we can find room for a good many trees on our lawn. Before the ground freezes, a pit of ample size and depth is dug, filled with manure and covered with straw or refuse to form a heat insulation.

"Next we barter for the tree. Sometimes, while driving through the country, we spy an ideal tree for the purpose, and a word to the owner either results in a sale then and there or a continuance of the quest until eventually the tree is found and bought. Before the ground freezes a trench may be dug around the tree and

A Live Evergreen Used as a Christmas Tree and Replanted Is an Everlasting Reminder of the Season's Joys

—o—

Above, the Tree Ready for Planting; Center, Set Out in the Grounds after Christmas, and Below, Serving Its Yuletide Purpose in the Living Room

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filled in with straw, to ease the task of removing the tree when it is wanted. Usually we select a tree not more than 5 or 6 ft. in height, although we did have one that was almost 8 ft. tall.

"A day or two before Christmas we go after the tree with a good-sized tub, spades and picks, and a large square of burlap to wrap the roots. It is generally but a short task to get the tree out, taking care to keep a ball of earth intact around the roots, and wrap it in the burlap. Then it is set in the tub and packed down with wood shavings or whatever else is available. When this is set before the fireplace in the living room, the tub covered with bunting and mica flakes and the branches alight with tiny candles, one would hardly recognize it as the lonely pine or evergreen that only a few days before stood in the corner of a pasture.

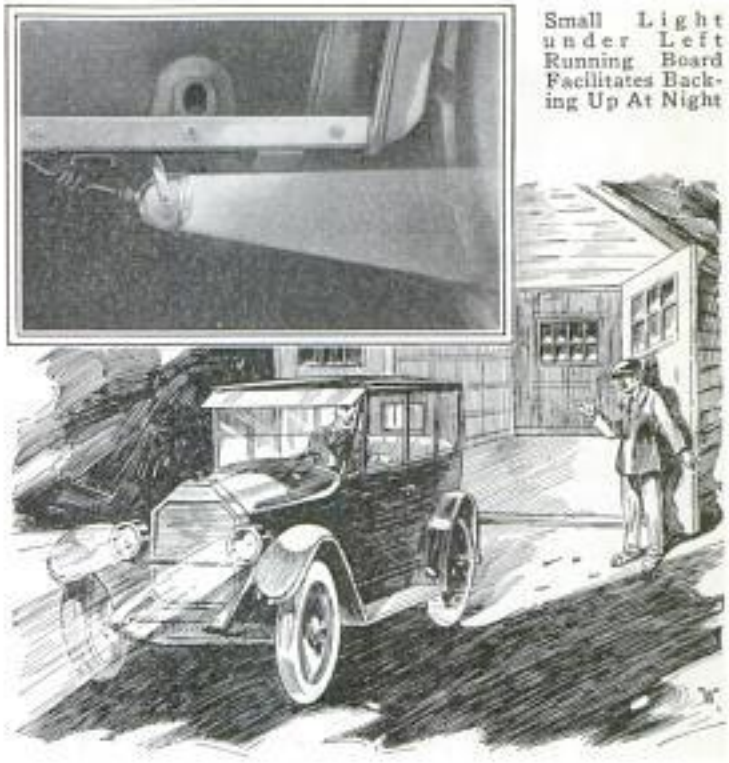
"That's about all there is to the process. After the festivities (we usually let the tree remain draped for two or three days) it is taken to its new home and, with proper rites, planted. We were somewhat surprised to find that even two days in a well-heated room did not take the frost out of the earth ball around the roots. For obvious reasons it is best that this should remain frozen."

Tin-Can Lamp Shade

An ordinary tin can has been found suitable to protect the worker's eyes from the glare of an electric lamp hung over a workbench and also to protect the lamp itself against accidental breakage. A hole, just large enough to receive the top or screw portion of the lamp, is cut in the bottom of the can. Then, with the screw end of the lamp projecting through this hole, screw the lamp into the socket.—G. H. Glitzke, Kansas City, Mo.

Backing Light for Autos

To facilitate backing an auto out of a garage or over a winding drive at night fasten a small spotlight under the running board on the driver's side of the car, as shown. An ordinary flashlight can be used for this purpose; it may be held between two spring clips, screwed to the underside of the running board. A permanent installation is, however, more convenient. A cheap reflector and a bracket of the kind designed to be attached to a single dry cell, are used. The bracket is straightened out so that it can be clamped under the rear running-board brace. The leads to the socket in the reflector are connected to a switch on the instrument board and to the storage battery, and a lamp suitable for the voltage of the battery is inserted in the socket. The light beam will illuminate the entrance to the garage sufficiently to steer the car into it without trouble. — Walter C. Harris, Brooklyn, N. Y.



Small Light under Left Running Board Facilitates Backing Up At Night

Placing Ice in a Refrigerator

As heat always travels to the top of an inclosure, it does so also within the walls of a refrigerator; hence, if a piece of ice is not large enough to fill the ice compartment, lay it in such a position that the largest portion is at the bottom of the space. This will save considerable ice where a small quantity is used at a time.

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Two Christmas Toys

by L. R. Butcher

Two Simple Toys, the Hopping Rabbit and the Walking Duck, That Can Be Made by Anyone Handy with Tools, and Will Delight the Children on Christmas Morning

VERY few tools and but common material are required for the construction of the toys described in this article. The first is a hopping rabbit in which an eccentric axle attached to the hind legs gives motion to the body as the toy is pulled along.

The rear axle of the toy, Fig. 1, is made from two pieces of ⅛-in. pipe bent to give the 1-in. offset, and threaded at the inside ends, where they are joined, between the rear feet, with a ⅛-in. pipe coupling. This construction allows the toy to be assembled after the axle pieces have been bent. The legs are kept from working out on the axle by ½-in. plain washers, secured by small cotter pins. The front axle is a straight piece of ⅛-in. pipe, of the same over-all length as the assembled rear axle.

A scroll, or band, saw is needed to cut out the body and legs. The approximate form of the body is obtained by dividing an 8 by 10-in. sheet of paper into 1-in. squares and sketching the shape, following Fig. 2 closely. A paper pattern may be cut and used as a guide in the layout of the body, or the layout may be done directly on the 1-in. board chosen for the body. The material for body and legs should be

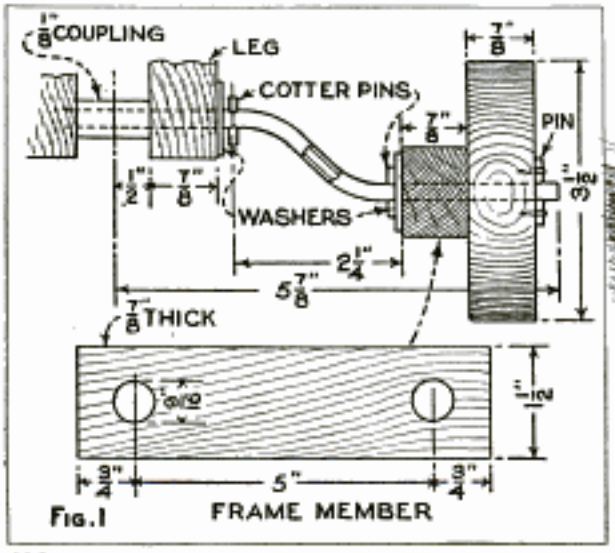
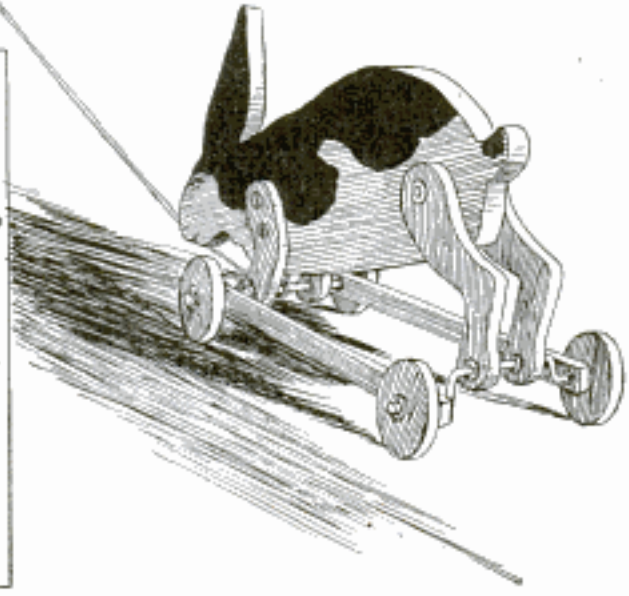


Fig. 1 FRAME MEMBER



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close-grained and free from knots and cracks. The two pairs of legs are laid out in a manner similar to that followed in shaping the body. The location of the pivot points for the legs is given in the illustration. The holes at the feet are 9/16 in. in diameter, while those at the upper ends are large enough to accommodate ¼-in. bolts.

A frame member on each side of the toy spaces the axles to a distance of 5 in. from center to center. These members are assembled just inside of the wheels, and are kept in place by washers secured by cotter pins. Wheels, 3½ in. in diameter and of clear-grained wood, are slipped on just outside of the frame members. The wheels are kept in place by washers and cotter pins on the front axle, but at the rear of the toy, the axle is made to turn with the wheels by omitting the washers outside of the wheels. A staple on each side of the axle will hold the cotter pins tightly.

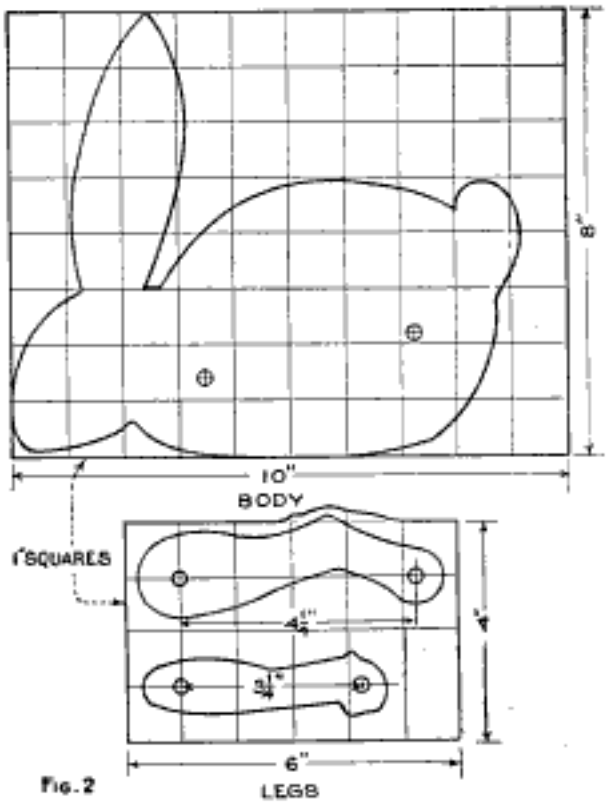

Fig. 2

The rear legs are pivoted to the body with an ordinary ¼-in. bolt. A washer, placed between each of the legs and the body, helps to reduce friction. The front legs are fastened firmly to the body, no provision being made for pivoting at this point. White paint for the body and legs and red for the wheels make an attractive color scheme. The body markings should be made with black paint. A looped cord attached to the front axle provides the means whereby the toy is drawn along.

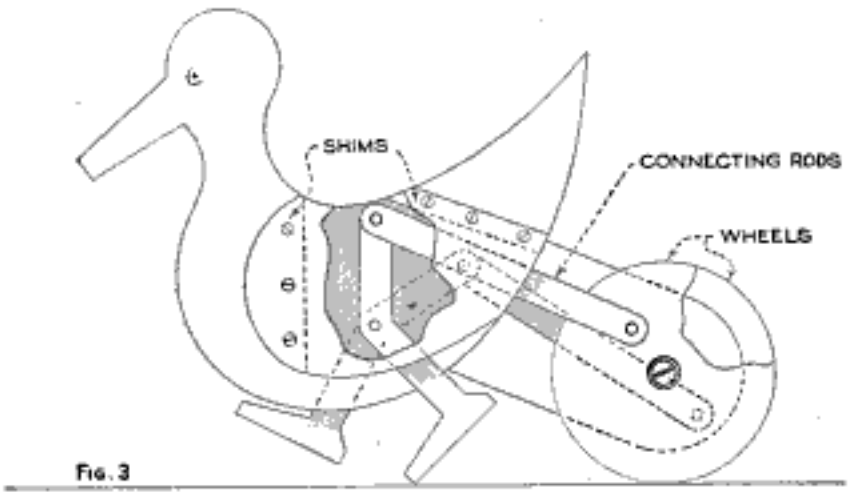

Fig. 3

ASSEMBLED VIEW OF DUCK

The toy illustrated in Figs. 3 and 4 has mechanical legs, which work in a lifelike manner as the toy is pulled along. Although the legs do not touch the floor, the duck appears to be trotting along after the youngster pulling it. The construction is very simple; no springs are used in it, and the finished toy is sturdy and almost unbreakable.

The layout of the body is shown in Fig. 4. By crosshatching a 10 by 12-in. sheet of paper into 1-in. squares, the approximate shape of the toy is easily sketched. While the shape may be only approximated, the two centers shown should be laid out with some care. The other parts of the toy are made to work from these centers. After the paper pattern has been marked, the shape may be transferred to the material used for the body. In order that the wheels may be far enough apart so that the toy will not tip over, it is best to use 2-in. material for the body. On each side of the toy, a wooden wing is nailed on. These are made of 1-in. wood and covered by a sheet-metal shield of the same shape. The pivot points for the legs should be laid out on the wing covering. As the legs and connecting rods work between the wings and the wing covers, there must be some clearance. This clearance is obtained by placing cardboard shims between the metal and the wood. The shapes of these shims should be such that they do not interfere with the concealed leg mechanism. In Fig. 3 the approximate shape of the shims is given. One is placed

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at the forward end of the wing and the other at the tail. Figs. 4, 6 and 7 give the shapes and dimensions of the wheels and leg pieces. Two of each of these shapes will be needed as the leg mechanism is the same on both sides. The legs and connector arms (Fig. 5) are cut from stiff sheet metal, while the wheels are made of 1-in. wood. The legs are pivoted to the inside of the metal shields on either side of the duck by a rivet, according to the centers marked in Fig. 4. One end of each connecting rod is pivoted to the upper end of the leg with a rivet and the other end of the arm to the wheel, 1 in. off center. The wheels must be counterbored slightly to bring the head of the center fastening screws below the outer surface of the wheel. A washer is placed between the inside of the wheel and the body, and another between the screw head and the outside of the wheel.

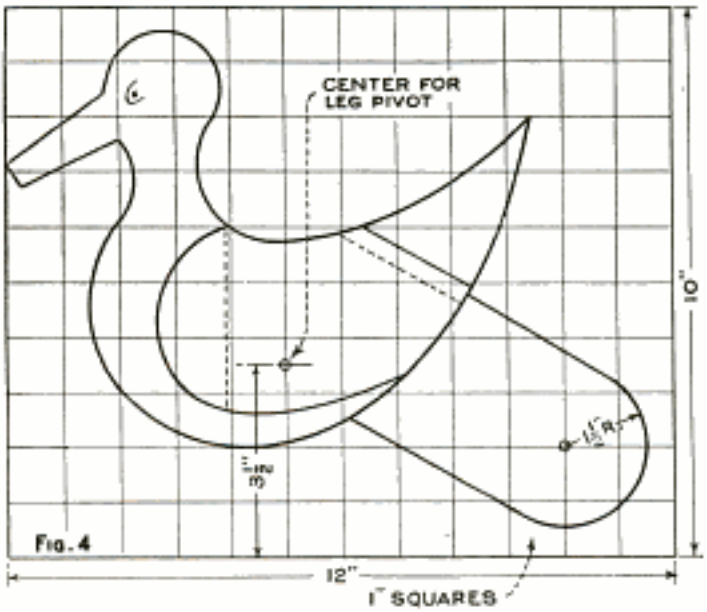


Fig. 4

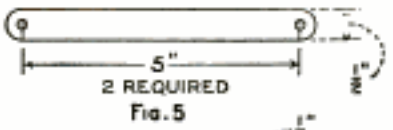


Fig. 5

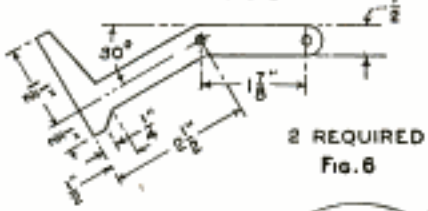


Fig. 6

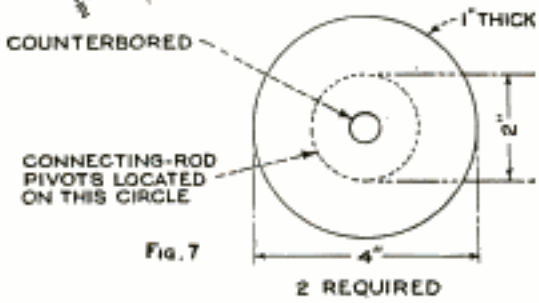


Fig. 7

The two wheels work independently of each other. If they are placed so that the eccentric points are exactly opposite, the leg on one side of the duck will be drawn back while the other is extended. All pivot points must work freely if the toy is to operate satisfactorily.

A handle made of ⅛ by 1-in. flat iron, ending in a loop for the hand, is fastened to the front of the toy. By painting the toy with contrasting colors, the representation will be more lifelike, but the coloring is a matter of individual taste, and is left to the artistry of the maker.

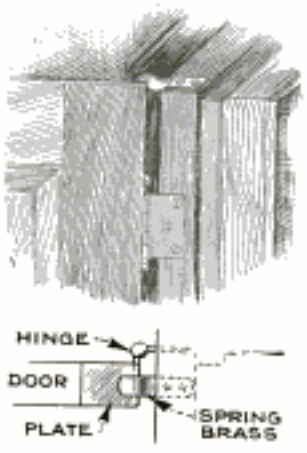
Kink for Home Dry-Cleaners

Thrifty housewives who do dry-cleaning at home will find that fabrics can seldom be cleaned satisfactorily in damp or rainy weather. This is due to the moisture in the atmosphere which penetrates and partly saturates the fibers of the material, causing it to resist the cleansing action of the gasoline. Although cotton goods gather more moisture than wool, silk, or other material, it is advisable in damp weather to dry all garments thoroughly before immersing them in the cleaning fluid, by hanging them over a warm radiator or near a hot stove.—G. E. Hendrickson, Argyle, Wis.

¶A piece of sheepskin with the raw wool on it makes a good windshield wiper that will keep the glass clear of frost and dew.

Keeping Doors Open

When doors have a tendency to swing shut, a spring-brass clip arranged above the door, as shown, will be found convenient. It is screwed to the underside of the frame just above the door so that the curved portion catches behind the door and prevents it from closing. A metal plate should be attached on the top of the door to prevent the catch from wearing a groove in the wood.



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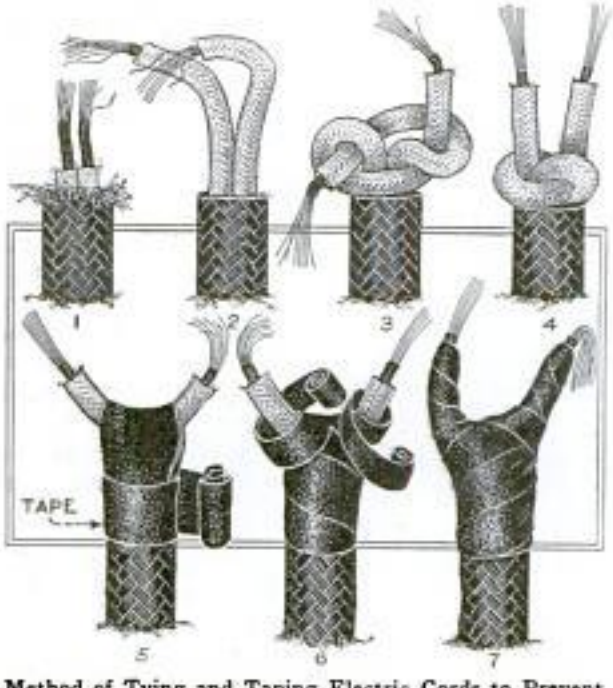
Preventing Rust on Tools

All good mechanics desire to keep their tools free from rust. Many methods are in use but all do not serve the purpose equally well. Calcium chloride, for example, will absorb all the moisture in a tool cabinet, but it soon becomes a saturated mess, which does more harm than good. However, a positive cure for the rusty-tool evil, which is very simple, is to place 10 or 15 cents' worth of animal charcoal (obtainable in any drug store) in a small tin box that has small holes drilled through the cover, and put it in the tool chest. It will absorb all the moisture without being dissolved, and when it can absorb no more, turns to a gray color, warning the user that it should be replaced with new charcoal. Replacement is needed only at long intervals, however.

Making Electric-Cord Connections

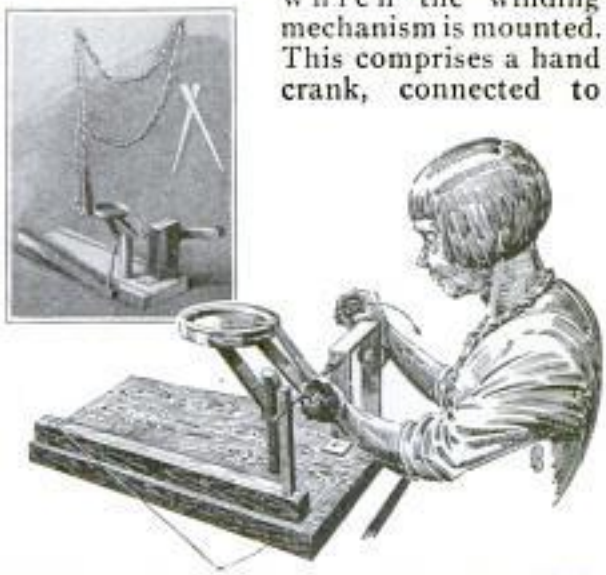
Trouble is often experienced with the cords used on electrical appliances. Almost invariably they are broken at the ends where the connections are made. This is because the removal of the insulation has made these parts more flexible than the rest of the cord and therefore the greatest bending strain takes place there. A good method of overcoming this trouble is shown in the illustration. Fig. 1 shows a cord cut off in the usual way, and Fig. 2 how to start to make a better job. With a sharp knife a cut is made around the cord through the braided covering and about halfway through the rubber. A scratch of the knife from this cut to the end loosens the braid, and then, by pulling the two wires apart, the rubber around them will separate, permitting it to be removed. The wires are tied together as shown in Figs. 3 and 4. Friction tape is next applied as indicated in Figs. 5 and 6, and the finished job should look as in Fig. 7, the bare ends of the wire projecting so that they can readily be attached to a fitting.



Method of Tying and Taping Electric Cords to Prevent Wires from Breaking

Beads for Paper Necklaces

Paper beads can readily be made with the aid of the simple device shown in the illustration. It consists of a base upon which the winding mechanism is mounted. This comprises a hand crank, connected to a ⅜-in. shaft held in a flat-iron bracket; a split needle, which is engaged with the end of the shaft; a wooden support for the needle, which can be swung outward as indicated by the dotted lines, and a tray for holding paste or glue. The split needle is a ¼-in. rod, and the end is squared to fit snugly into a hole in the end of the shaft, which makes it easy to remove. A small gear is fitted to the end of the shaft to engage with a larger gear on the crank arm. The beads are made from tapered strips of paper, which can be cut from colored parts of magazines; the wide end being inserted in the split needle. A few turns of the crank will wind the whole strip into a compact roll. The end is dipped into the glue before it is wound on. The bead is then removed and given a coat of white shellac. The size and shape of the beads can be varied by varying the width and length of the paper strips.



Bead-Winding Device Facilitates Making Paper Necklaces

Cmb. W. Fr. Rittenhouse, 72 Middlesex Ave. Swampscott, Mass.

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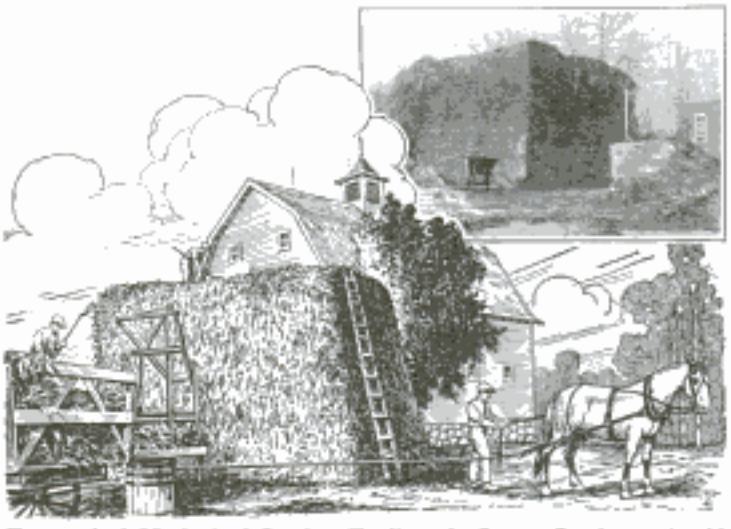
Storing Ensilage

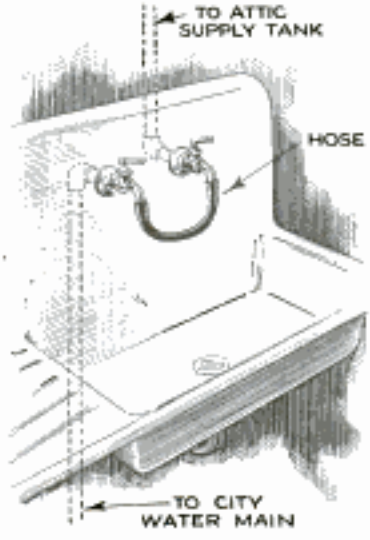
Good silos are rather expensive to build and every farmer cannot afford one. The ensilage can, however, be stored outside in large stacks about 20 by 20 ft. square, as shown in the illustration, about fifty loads being put in such a stack. It can be built up flat as it need not necessarily shed water. It is a good idea to cut and stack the corn before frost, if possible, and stack it green, for if the corn is frosted or dry, due to lying out after being cut, it must be wetted while stacking, as is the customary practice when putting it in a silo. A hay stacker can be used to elevate the corn. It is necessary to build the stack as compactly as possible and for this reason it is advisable to build it high. By spreading the work over a week or so, the stack has time to settle. Care must be taken that the sides do not project beyond the base, or the stack is apt to slip. To guard against this, posts should be propped against it, with 2-in. boards at the top ends. A dairyman, who had more corn than he could put in his silo, and therefore stacked some of it in this way, says that his cows preferred this ensilage to that stored in the silo.



Economical Method of Storing Ensilage in Large Stacks to Avoid the Use of a Silo

Water-Heating Kink

In homes that are provided with a soft-water tank in the attic as well as hard water under pressure, the soft water is usually piped to the laundry and bath through a hot-water boiler, which is heated by the kitchen range or furnace. Should the supply of soft water give out, as it sometimes does, the fire in the range must be extinguished to prevent burning out the hot-water coil, to say nothing of the inconvenience of carrying water to the bath and laundry. This trouble can be avoided by fitting a short length of rubber hose over the faucets at the kitchen sink, as shown in the illustration. One end of the hose is attached to the hard-water faucet and the other to the soft-water faucet. Then, by opening both, the attic tank will be filled with hard water and the system kept in operation.



Preventing Tail-Light Theft

In some localities the theft of tail-lamp bulbs is prevalent. As it is such a simple matter to remove the bulb from a tail lamp, the mere pushing in of the thin celluloid window in the side of the lamp giving access to the bulb, motorists will appreciate an equally simple remedy, especially where police regulations are strictly enforced, as the absence of a tail light may mean a fine. In place of the flimsy celluloid, cut a section of strong open-mesh wire to the same size, and slip it into place; it may be soldered if desired, but if it is fitted tightly, this is not necessary. With this in place, the bulb can only be removed by taking out the red glass, and as the split-wire ring holding this in place is not usually easily taken out, the average sneak thief will transfer his attentions to some other car.

¶To get rid of the wrinkles in a sheet of paper stretched over a wooden frame, a sign painter simply touches a wet cloth to the center of the sheet, when it stretches out as tight as a drumhead.

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RADIO

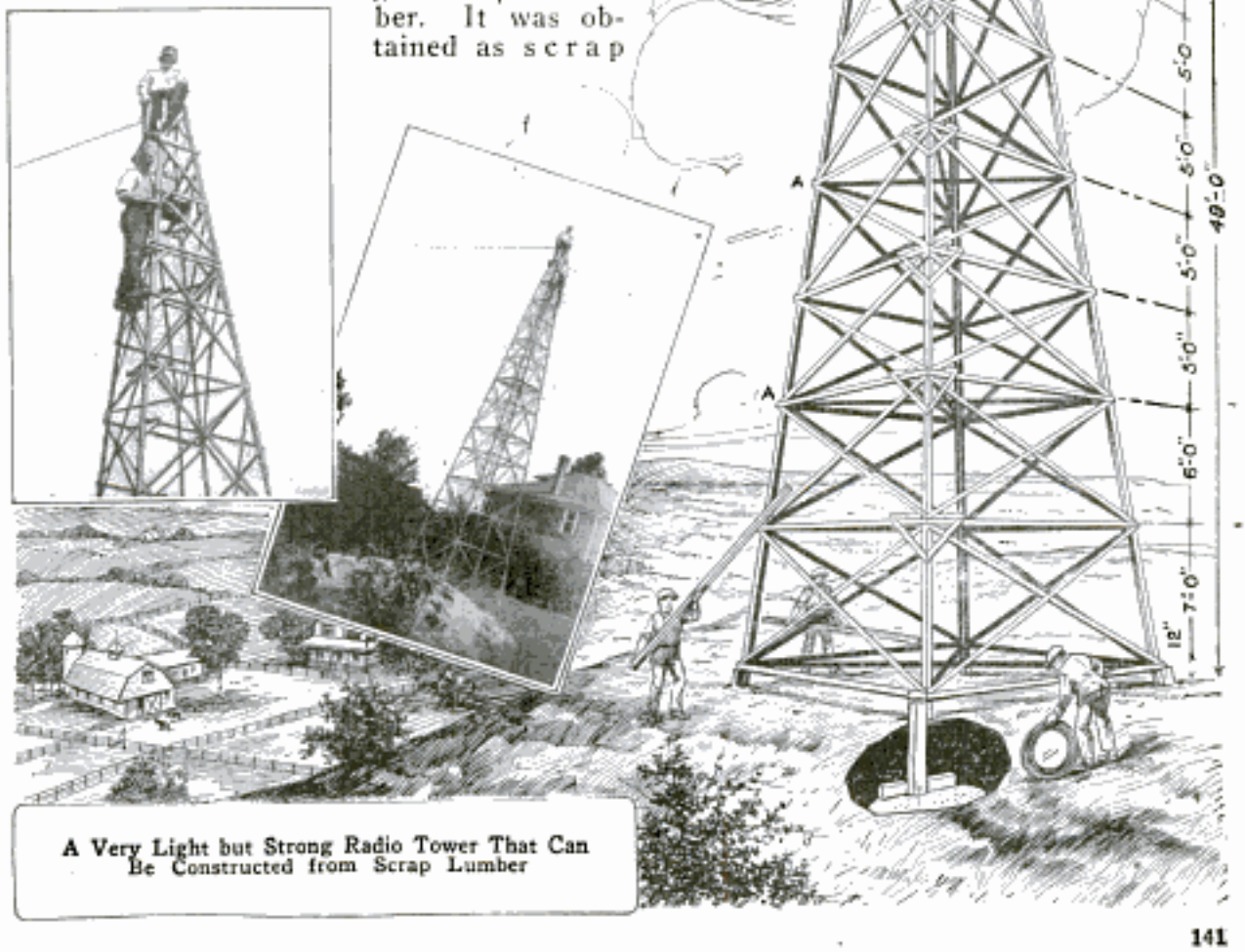
Building a Radio Tower

By R. DeWOLF, Farmington Road, Kensington, Conn

FOR the experimenter who is not lucky enough to have a suitable location for his radio antenna wires, the tower described below will "fill the bill" and at the same time be an addition to his station that he may well be proud of. As will be seen from the photographs the tower is strong enough to stand up in all kinds of weather and support a reasonable load.

In moving to a new location, the writer realized that he was "up against it" for a support for the far end of his antenna, and on pricing material for a mast of the required height (about 50 ft.) found that it would run into considerable money, so decided to build up a mast of light material, from which grew the tower herein described.

The material varies from ⅞ in. square to about 1¼ in. square, with a few pieces at the top about 2 by ⅞ in., all of which is a cheap grade of pine lumber. It was obtained as scrap



A Very Light but Strong Radio Tower That Can Be Constructed from Scrap Lumber

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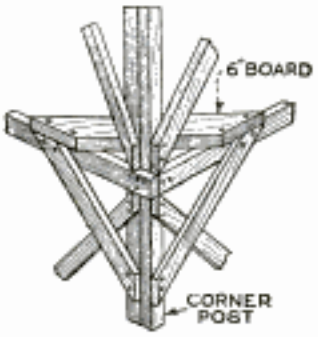
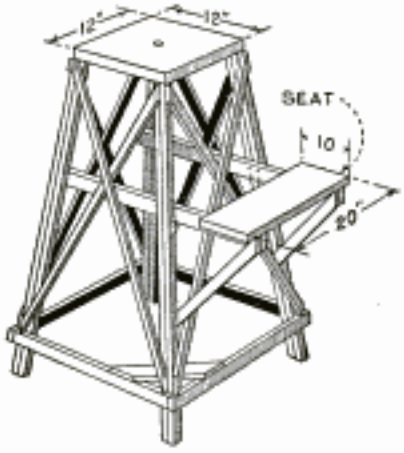
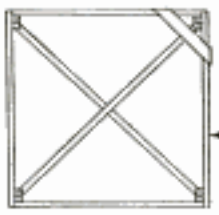
from a near-by template shop, at $1.50 a load and varied in length from 10 to 15 ft. The cost of the completed tower, including nails and paint, therefore, was only five dollars. This, of course, was a particularly lucky bargain, but nearly everyone can dig up somewhere about the place a few feet of 2 by 4-in. stuff for the "dead men" used to anchor the tower at the corners, and exclusive of these, the necessary lumber could be purchased for from $6 to $10, depending upon the location. A gallon of paint at about $2.50 and 5 lb. of eight-penny box nails are the only other materials required. The tower is made up of four sides, all similar, as shown in the drawings. Each joint is fastened with two nails; box nails being used because they have a large flat head, are of soft wire and are easy to clinch. Each side was made complete and the four nailed together before the tower was finally raised and anchored.



DETAIL OF CORNER OF TOWER SHOWING STEPS AND BRACES



VIEW OF TOP OF TOWER SHOWING SEAT

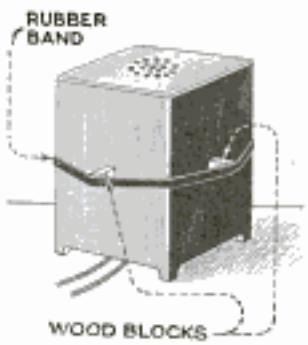

SECTIONAL VIEW THROUGH TOWER AT A

By building the tower in this way, a double post was obtained at each corner where the sections are nailed together. These should be well fastened with nails spaced about 6 in. apart and clinched, thus forming a good stout compression member at each corner.

Referring to the drawings, it will be seen that there are five sets of horizontal crossbraces, which serve to tie the structure solidly together, and at the same time act against any twist that may be set up by the tension in the antenna wires. After the tower is raised the location for the "dead men," or anchors, may be marked and the tower lifted to one side and the holes dug. These anchors should be buried to a depth of about 3 ft., and the earth well packed down over them. On recent examination, the writer has found, after some four months of service, that this tower is apparently in as good shape as when first erected and bids fair to stand for quite a long time.

Reducing Charger Noise

The humming noise that accompanies battery charging with certain types of chargers can be greatly reduced if the charger is placed on a soft rug or mat, and a strong rubber band placed around the middle as shown in the illustration. Pine or basswood posts, measuring ½ in. square by 1 in. long, must be placed between the rubber band and each side of the charger. The posts should have three or four layers of felt tied or glued to each end. While this remedy will not silence the charger entirely, it moderates the hum.



Use a Lightning Arrester

In spite of the fact that almost every article describing how to make a radio set stresses the importance of the lightning switch or arrester, and that the same advice is given in the manual accompanying most purchased sets, many set owners neglect to install this apparatus.

Approved lightning arresters are so cheap and so easily installed that there is no excuse for not using one. The modern arrester is also a neat and inconspicuous device, and may be mounted inside the house without being noticeable at all or detracting from its effectiveness; in fact, it is preferable to mount it inside to protect it from moisture. When so mounted, it may be grounded to a convenient water pipe or radiator, preferably the former.

Not only will the arrester protect the set when a storm comes up, but it may be of aid in securing payment of insurance

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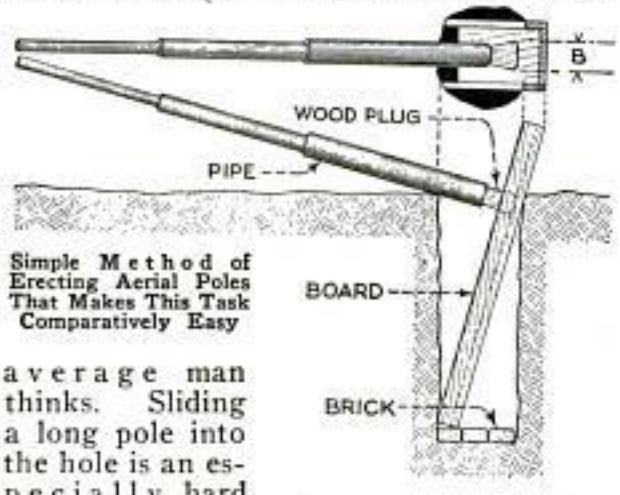
if a fire occurs. The arrester used should be one that is authorized by the underwriters, and the installation should be examined and approved by an electrical inspector or one from the insurance company. Of course, the presence or lack of an arrester in many cases will have no bearing on the insurance, but it is always the unexpected that happens, and it is only good sense to be on the safe side.

Improving the Headset

A French amateur has found that the purity of tone of the headset may be greatly improved by piercing the diaphragm. A small hole—about .1 in diameter—is drilled through the diaphragm in each receiver. This idea has been tested in both wire telephony and radio, and, it is said, results in a precision and clarity of tone unobtainable otherwise.

Erecting Antenna Masts

To erect an aerial mast made of pipe without previous experience and do a good job of it is a bit more difficult than the



Simple Method of Erecting Aerial Poles That Makes This Task Comparatively Easy

average man thinks. Sliding a long pole into the hole is an especially hard task. The drawing shows a method that has been found to facilitate the work considerably. A board, about 6 in. wide, is set up in the hole, strips of wood being nailed on the sides to keep the pipe from slipping off. A wooden plug is driven into the end of the pipe so that it will slide down the board more easily. The plug should be wide and flat on the end, as indicated at B, to prevent the pole from turning, and the end rounded off and given a liberal application of grease or common lard, to reduce friction.—M. E. Duggan, Kenosha, Wis.

¶The transmission range of the high-power radio stations that terminate in the United States totals over 40,000 miles.

Radio Set Rings like Wire Phone

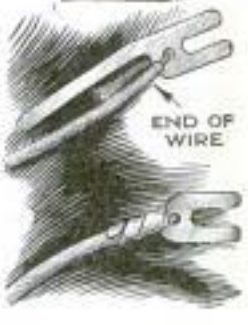
When Lewis M. Clement was a ship operator, and was compelled to stand watch hour after hour with the phones on his ears becoming more and more uncomfortable,

Lewis M. Clement with His Automatic Receiver, Which Rings a Bell When the Station Is Called

he registered a vow that some day he would invent an apparatus that would call operators by means of a bell. This he has done. With a device that he has recently perfected, any one of 78 stations can be called on the same wave length and the operator notified that he is wanted by the bell. Briefly, the use of standard train-dispatching equipment in connection with a radio telephone enables the operator at the phone, by turning a key marked for a particular station, to send out impulses that will operate selector switches at the receiving instrument. These switches are arranged like the combination on a safe, so as to operate only when a certain combination of impulses is sent out.

It will be possible to extend the system so that 200 stations can be signaled individually. Five tubes must be kept lighted continually when the receiver is ready for incoming calls, but the current consumption is so small that this is a negligible item of operating costs.

Neat and Handy Wire Terminal



With the use of a new terminal, shown in the illustration, the work of making wire connections in radio circuits is facilitated considerably. The end of the wire is bared in the usual way, the terminal slipped over it and the "tail" of the terminal wound around the wire, as shown, which prevents the connections from being loosened.

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Piano Combines Radio Set and Player

The combined radio set and phonograph we have had with us for a considerable time, but now appears a more ambitious instrument—the combination player piano and radio set, which claims as its advantages economy of space and concealment of the set, when not in use, in an attractive piano case.

The Latest Radio Instrument, a Combination Reflex Set and Player Piano

A three or four-tube reflex radio set is used in connection with a loop aerial and loud speaker. The radio panel is concealed behind a small door to the left of the spool compartment of the piano; the A-battery is set within the base of the instrument, on the left-hand side, and the B-batteries are similarly concealed on the right. The loop aerial fits in a socket on the top of the case, and when this is removed and the door in front of the panel closed, there is nothing to indicate that the piano is not a standard instrument. The tubes are protected against injury from vibration when the piano is played by mounting the whole set on sponge rubber.

Radio Opens Garage Doors

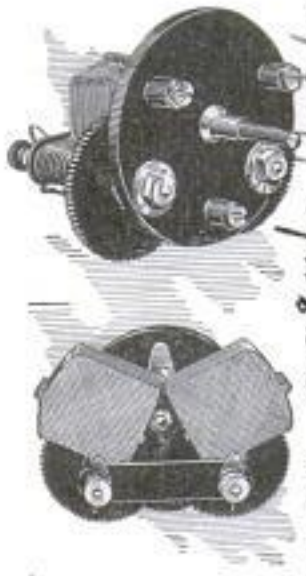
A London inventor has recently produced a radio device which opens the garage door while the car is 50 or more yards away from it. It consists of a simple spark-coil wireless set, located in the car and connected to a 4-ft. aerial. A switch, mounted on the dash, closes a circuit which causes a radiation of 10-meter waves from the antenna. The waves are picked up by a receiver located in the garage, and this operates a relay, that starts a motor which, by means of pulleys, opens the door.—H. T. Wilkins, London, England.

Hunting Criminals with Radio

Within a short time every sheriff in the 99 counties of Iowa will be provided with a portable radio-receiving set. This movement is backed by the Iowa State Bankers' association, with the co-operation of the individual county associations. Latest reports on all crimes committed in the state will be given at 11:00 a. m. every day at the state capital by a broadcasting station, and emergency calls are to be signaled by ringing a bell or gong so loudly that none of the sheriffs will be likely to miss them. The sets will be portable so that the sheriffs can install them on their cars and receive reports while driving.—George Smedal, Sioux City, Iowa.

New Condenser Has Twin Rotors

A variable condenser recently placed on the market has no stationary plates, making possible a considerable improvement in the electrical properties of condensers of the rotary variable type. Tests of this condenser show a very low loss, as the construction permits the reduction of the amount of insulation used to a minimum, and what bakelite is used, is in the weakest part of the field. No metallic connection to the plates extends through the panel; thus, complete shielding is practical, and, even in unshielded sets, body-capacity effects are reduced or eliminated entirely, regardless of the condenser connections. This simplifies the wiring. Both sets of plates are insulated, and the ratio of maximum to minimum capacity—165 to 1—insures a large tuning range.



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Charging Radio A and B-Batteries

By EDWIN J. BACHMAN, Box 51, Fullerton, Pa.

WITH the increased number of radio sets in use there has been a rising demand for storage batteries. The owner, however, does not make many trips to the charging or service station with his unwieldy burden before his thoughts turn to the possibilities of charging the batteries at home. If the home is wired for electric light, the rest is easy. Should he live in a locality where direct current is used for lighting, all he need do is to determine the polarity of his line wires so that he can connect the positive wire to the positive post of his battery, insert the proper resistance and proceed to charge.

To charge an 80 or 100 amp.-hour battery it was the common practice to run the "juice" through a bank of four or five carbon-filament lamps. A 32-cp. carbon lamp passed about 1 amp. at 110 volts, so if 5 amp. was the charging rate desired, five lamps were connected as shown at the left in Fig. 1. Since tungsten-filament lamps have almost entirely taken the place of the carbon, and since these have a much greater efficiency, and demand less current, it would take about three times as many lamps to pass the same current; this makes a clumsy installation, as well as an expensive one. A much simpler and better method, therefore, is to connect an electric flatiron or a small heater of the headlight type in series with the battery, as shown at the right in Fig. 1. These devices usually pass from 4 to 6 amperes.

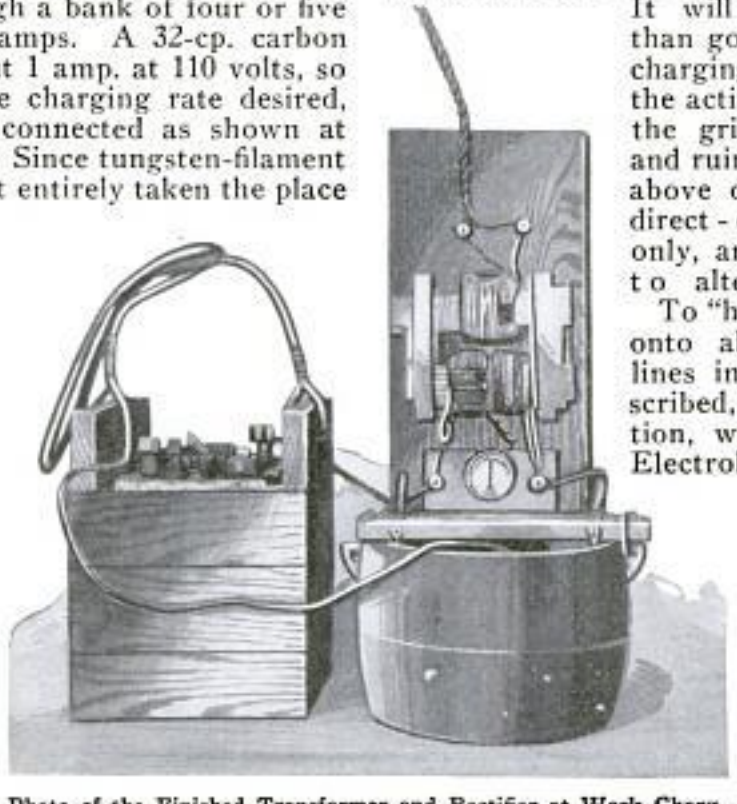

Photo of the Finished Transformer and Rectifier at Work Charging a Battery

Determining the polarity of the wires is a simple matter. The bared ends of two wires leading from the supply lines are immersed in a jar containing some water in which a couple of teaspoonfuls of salt have been dissolved. Care must be taken to keep the ends of the wires at least ½ in. apart. When the current is switched on, bubbles will form on both wires, but a greater quantity of bubbles will gather on the negative wire and be discharged from it. The wires should then be marked to distinguish them. Storage B-batteries are connected as shown at the left in Fig. 2 for charging from direct current, the unit being connected in series with a 40-watt tungsten lamp and the current run through for four or five hours, or until all the cells gas freely. If more than one unit is to be charged at a time, they may be connected either as shown in the center or at the right. These units will not run down for several months, but should be put on charge at least once a month to keep them in good condition. Do not put more than one lamp in series with a unit with the expectation that this will reduce the time required for charging. It will do more harm than good, as too high a charging rate will force the active material out of the grids in the plates and ruin the battery. The above directions are for direct-current charging only, and will not apply to alternating current.

To "hang" the batteries onto alternating-current lines in the manner described, without rectification, would be ruinous. Electrolytic rectifiers have been described before, and possibly the reader has tried to construct one of the quart-jar lead-aluminum type, and found that after a short time it heated and possibly boiled over. This, at least, was the writer's experience, and the following description shows how he overcame his rectifier troubles. The lead-aluminum combination works efficiently at 87° F., but if the solution heats much beyond this point it will not rectify, and will pass an alternating current instead of a pulsating direct one.

Since aluminum cooking utensils have become popular, an old 6 or 8-quart iron cooking pot will probably be found stowed away in the garret or cellar of most homes. It makes an ideal rectifier jar. The pot itself forms one element; being metallic,

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it dissipates heat rapidly, and, owing to its large capacity, it will pass heavy currents without overheating. If equipped with two separate aluminum electrodes and connected to a transformer as described herein, the combination becomes a full-wave rectifier, and works very efficiently.

The wire handle is removed and a strip of wood, 1 by 2 by 10 in. in dimensions, is drilled for hookbolts to fasten it to the handle ears. The wood should be given several coats of shellac to render it waterproof. One ¼-in. hole is drilled in the side of the pot, near the top, for a binding post. Sheet aluminum, about ⅛ in. thick, may be used for the plates. To pass enough current they should measure at least 6 by 6 in., with lugs left at the tops for fastening them to the wooden cross strip and making the electrical connections. An aluminum pot or dish, about 2 in. less in diameter than the iron pot, may be used for the elements, if sheet stock is unavailable. This must be cut through the center, as shown, to provide the two elements. The wooden strip is drilled for 1½-in. brass machine screws, the heads of which hold the aluminum elements secure. Brass nuts hold them in place and provide means for fastening the wires from the transformer secondary.

The electrolyte is a saturated solution of common borax. Dump a ½-lb. package into enough warm water to fill the pot within 1 in. of the top. As long as some of the borax remains in the bottom undissolved after thorough stirring you have a saturated solution. A 60-watt toy transformer was first used with this rectifier, as shown in Fig. 4, passing considerably more than 1 amp. Although it took quite a while, I could charge the battery all right. The desire to charge it in shorter time induced me to construct the trans-

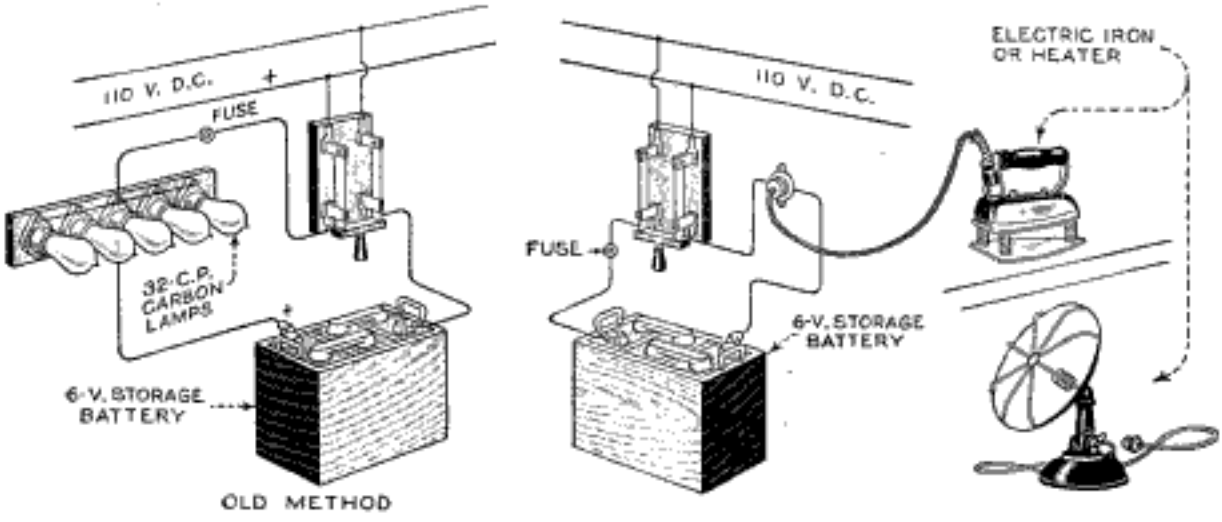

FIG. 1

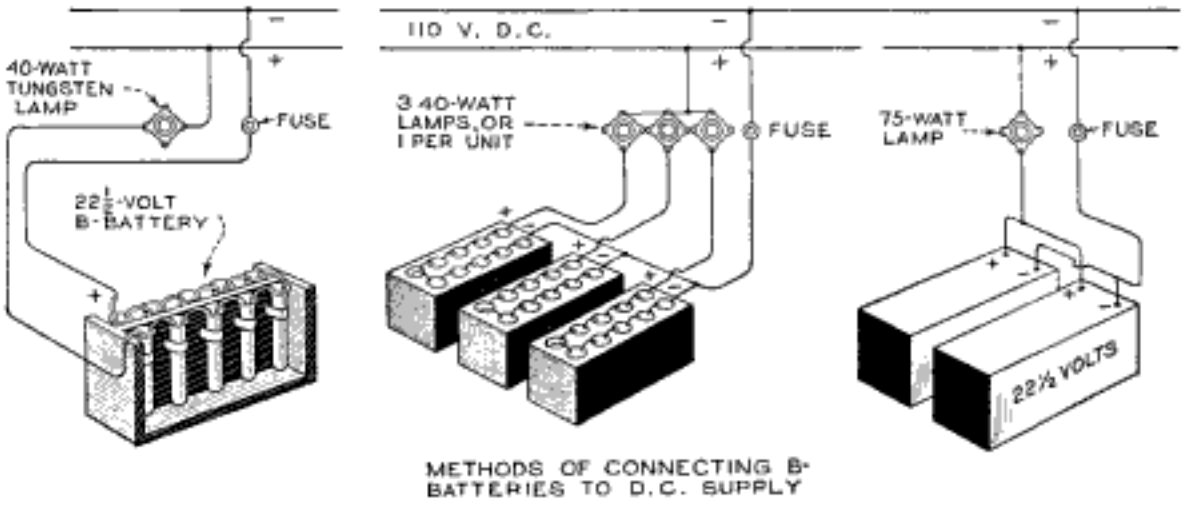

FIG. 2

Method of Using Direct Current to Charge A and B-Batteries, Using Carbon-Filament and Tungsten Lamps, Also Flatirons or Heaters, as Resistances

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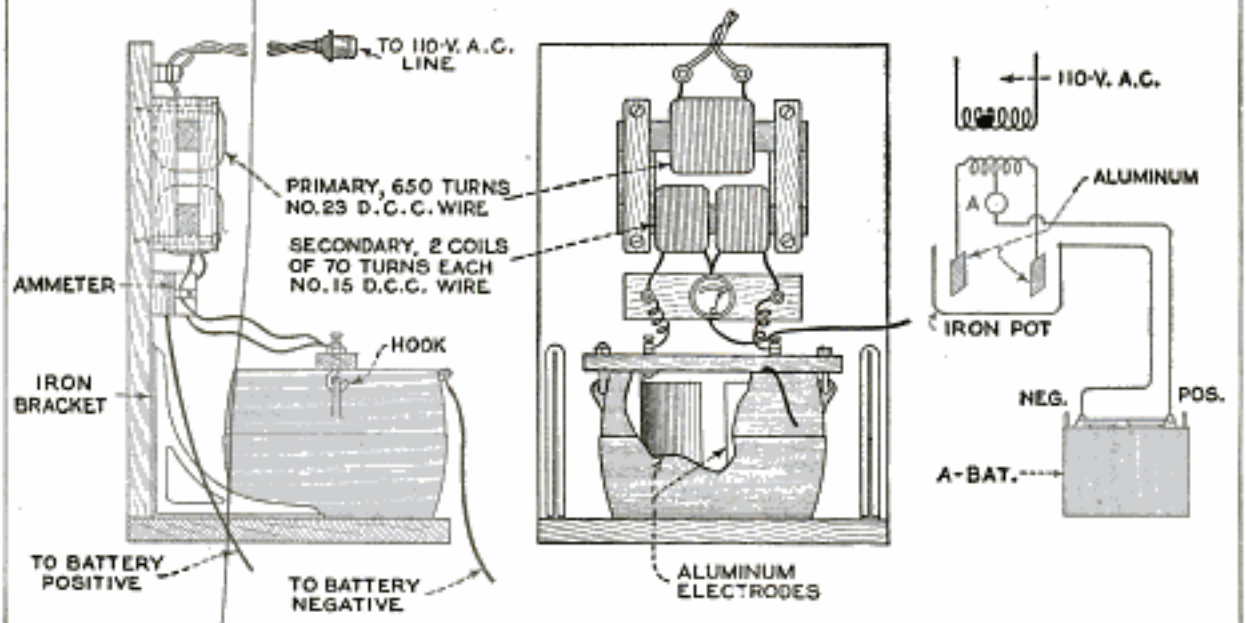
Thordarson Mfg. Co, 500 W. Huron / Chicago.



HEAVY-DUTY RECTIFIER FOR STORAGE BATTERIES

Fig. 3

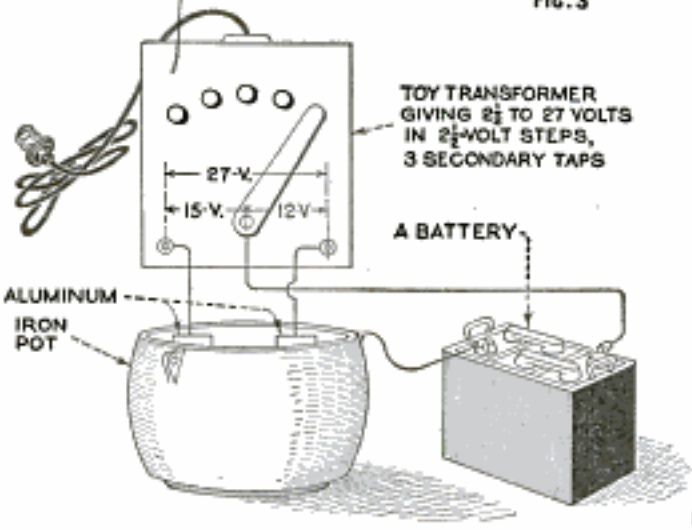


Fig. 4

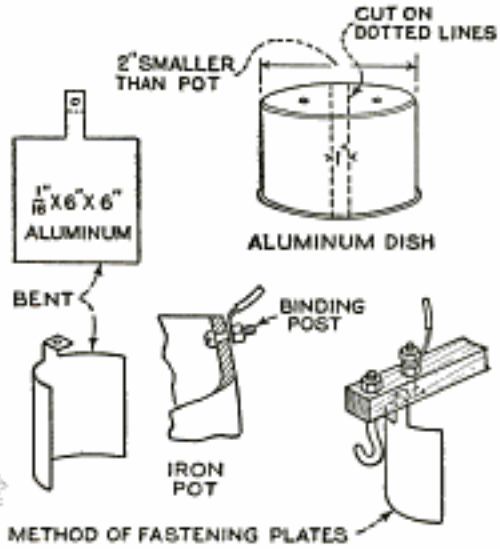
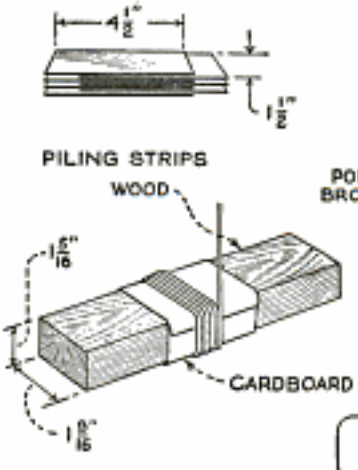
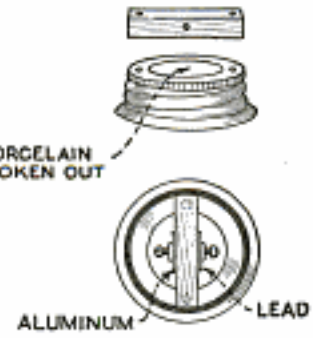


Fig. 5



WINDING COILS

Fig. 6



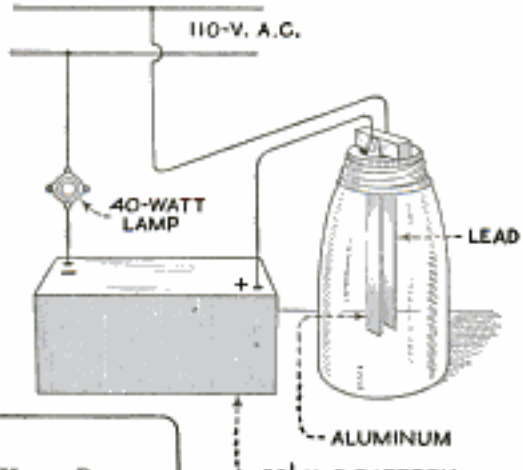


Fig. 7

Details of Construction of Heavy-Duty Rectifiers and Transformer for Charging Radio A and B-Batteries from Alternating House Current

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former shown in the drawings. Back numbers of this magazine, particularly the issue of August, 1922, page 293, were consulted for transformer data. These were adapted to fit the material at hand, as the exact sizes of wire were not in stock. The sheet iron had done service on a neighbor's roof and was cut to 1½-in. strips, 3 and 4½ in. long. Enough of these were cut to make two piles 1¼ in. high of each length, when compressed. Each strip was given a thin coat of shellac and allowed to dry. A piece of cardboard, 3 by 6 in. in size, was wrapped around a stick that measured 1 5/16 by 1 9/16 by 8 in., and on this the primary was wound. This consisted of 550 turns of No. 23 wire, wound on evenly, each layer being insulated with paper and shellac. This was found to heat when in operation for a great length of time, so 100 more turns were added later. The builder may wind 650 to start, or consult the tables in the before-mentioned article for a 150-watt transformer, if any other size of wire is used. It may be, however, that heating was caused by higher local voltage than the normal 110 volts.

The secondary was wound on the same wooden form in two sections, both being wound in the same direction; 70 turns of No. 15 wire were used in each. When assembled, the ending of the first was connected to the beginning of the second and a tap taken off here to the ammeter. After winding, all coils were given a good coat of shellac and placed in the oven with the heat on but the door open, and the coils allowed to dry thoroughly.

The longer sheet-iron strips were assembled in the coils as shown in Fig. 6. After placing as many as could be forced in, the primary and secondary were placed on the table side by side, and the 3-in. pieces slipped into the spaces between the projecting ends. Two wrought-iron strips, ¼ by 1 by 5 in., were used to secure the completed transformer to the upright panel board shown in Fig. 3, but wood strips can also be used, and are more likely to be available. An ammeter is not absolutely necessary, but it will show the charging rate. The one used was taken from the instrument board of a junked automobile. This one was back-connected, so it had to be raised on a subpanel, mounted on small wooden blocks. The center tap of the secondary coils is connected to one of the ammeter terminals. To the other terminal is fastened a lead of heavy wire that is connected to the storage-battery positive. The other ends of the secondary are each connected to one of the aluminum electrodes of the rectifier, and the lead from the post on the side of the pot to the battery negative posts. A length of flexible cord, with an attachment plug, is connected to the primary terminals and may be fastened to the panel board with porcelain knobs.

This device cannot be used to charge B-batteries, since the secondary voltage is not high enough. But these can be charged in the same manner as described for charging them on direct-current, with the addition of a small rectifier made from a quart jar. Strips of sheet lead and aluminum, measuring 2 by 6 in., are used for the elements, and borax for the solution as before.

The porcelain of the quart-jar screw cap is broken out, as in Fig. 7, and the zinc cut away to allow the electrodes to pass through it without touching. A block of wood is fastened to the cap with wood screws and to this the plates are fastened, also with wood screws; care being taken that the screws do not touch in the block. If washers are placed under the heads of the screws, these may serve as binding posts as well.

It will be found that the aluminum is gradually eaten away and will have to be renewed; the heavier the stock, however, the longer it will last. If the elements become coated with a thick white crust they should be scraped with a sharp-edged tool or an old file. The iron pot and lead elements may wear away too, but after several months' use, mine seem to be the same as when first put in service.

The advantage of using a transformer lies in the greater efficiency obtained. Should resistance alone be used in charging A-batteries, in connection with the rectifier, there would be a constant drain of 5 amp. on the line and the light bill would run up accordingly. With the transformer, the primary draws from 1 to 1½ amp., while the battery still gets the 5-amp. rate. The special secondary winding with two aluminum electrodes gives full-wave rectification which would not be the case with resistance. This alone shortens the charging time by about one-half.

359-R

Removing Enamel Insulation

Removing enamel insulation from wires is rather difficult especially when the wire is very fine. Scraping requires quite some time, and one is not always certain that all the enamel has been removed. An easy method and a sure one is to heat the wire until it is red and then plunge it into alcohol. This will remove the enamel quickly and completely.—A. C. Cole, Chicago, Ill.

Box 449

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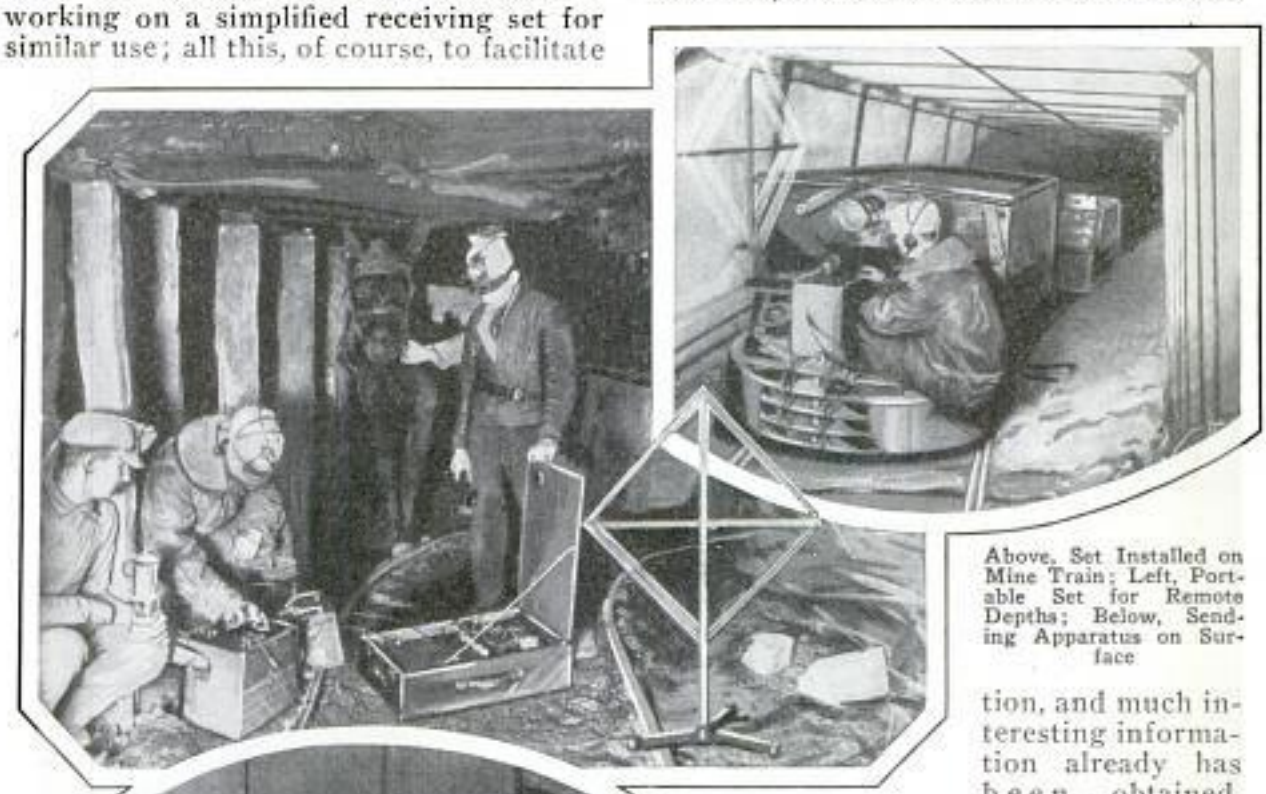
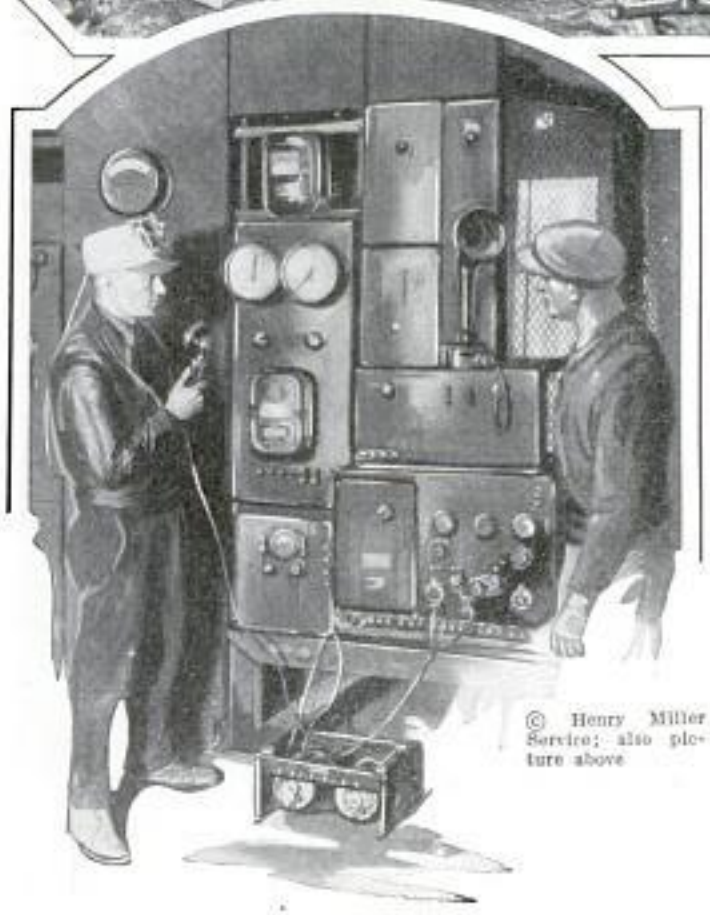
Radio to Rescue Entombed Miners

WITH the success of radio reception in underground localities such as tunnels and mines demonstrated, the U. S. bureau of mines has now turned its attention to the development of a sending set to be used by mine crews in communicating with the outside in emergencies. At the same time the bureau is working on a simplified receiving set for similar use; all this, of course, to facilitate life-saving in mine disasters. So far, it has been found most practical to operate the apparatus on the wired-wireless principle, which makes use of the mine trolley and eliminates the need for high-powered sets. In making these investigations, all factors that might have any bearing on the work, are taken into careful considera-



Above, Set Installed on Mine Train; Left, Portable Set for Remote Depths; Below, Sending Apparatus on Surface

tion, and much interesting information already has been obtained. The mine car, or "electric mule," has been found a good place to keep the set, with the engineer as radio operator. Portable receiving sets are carried to remote depths where telephone lines have not yet been installed.



© Henry Miller Service; also picture above

London and New York May Talk by Radio Phone

Telephone subscribers in London may be able to talk to New Yorkers by radio telephone on favorable days in the near future if plans of a British committee now working on the project are realized. They have recommended that their government install an experimental 200-kilowatt telephone transmitting plant at the station at Hillmorton, similar to that now used in telephoning from America to Europe. Radiophoning from New York to London has proved successful.

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Artists Sing Behind Glass

Besides being the first broadcasting station to use concealed microphones, WFBH has its studio separated from its reception room by a soundproof glass partition. Artists awaiting their turn and guests may see the performers in the

Concealed Microphones and Soundproof Glass Partition Are Features of WFBH

studio and can hear them by means of a receiving set placed outside the partition.

Use of "Spaghetti" Tubing

"Spaghetti" or other protective tubing should be used sparingly, if at all, in radio-frequency circuits. In audio-frequency circuits, on the other hand, it should be used to prevent high plate-voltage leads from touching at all points where they cross. It can also be used on filament leads to prevent shorts.

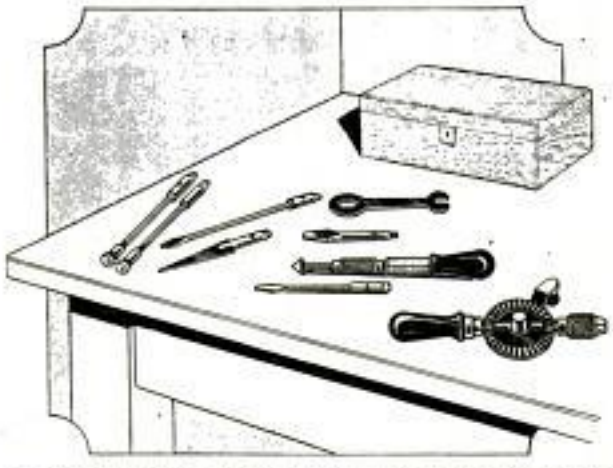
Selecting a Loud Speaker

There are many loud speakers on the market and many people are undecided as to the particular type they should buy. Most of the instruments will produce a pure note with fair accuracy, but if this is accompanied with a rattling or scratching sound it is certain that the horn will not reproduce a complicated sound such as is made by a band or orchestra, or a combination of voices. This trouble is due either to a faulty construction of the microphone or metallic vibrations of the horn. A single voice or note of an instrument gives a good indication of its tonal quality; if it gives good volume and clear tone on both higher and lower notes, the horn is most likely a good one. Piano music is a good index to the quality of a loud speaker. A good type of horn now on the market has a wooden or composition bell which is inserted in a base containing a delicate microphone.

No matter how good a loud speaker is, it cannot function properly with a poor receiver. Usually two stages of amplification are necessary to give signals enough volume for a loud speaker. The receiver must be free from excessive noise caused by too much filament current and too high plate voltage. If the instrument is tuned too closely, there will be an accentuation of the lower notes at the cost of volume in the higher ones, which often happens when receiving far-distant stations. This fault can be remedied by the use of one or more stages of radio-frequency amplification, which allows a little more latitude of adjustment.—F. L. Brittin, Chicago, Ill.

Tools for the Radio Builder

A new combination tool for use in constructing radio sets, which will prove helpful to anyone engaged in this work, has recently been put on the market. It consists of a ratchet tool holder, which is operated by turning the handle back and forth. It has three convenient adjustments; right-hand, left-hand and rigid, and a touch of the finger on the ratchet shifter gives any of these adjustments. There are special screwdriver blades for reaching down into the cabinet and passing between wires, and others for small dial screws and heavy aerial screws. Sockets that fit the different sizes of nuts

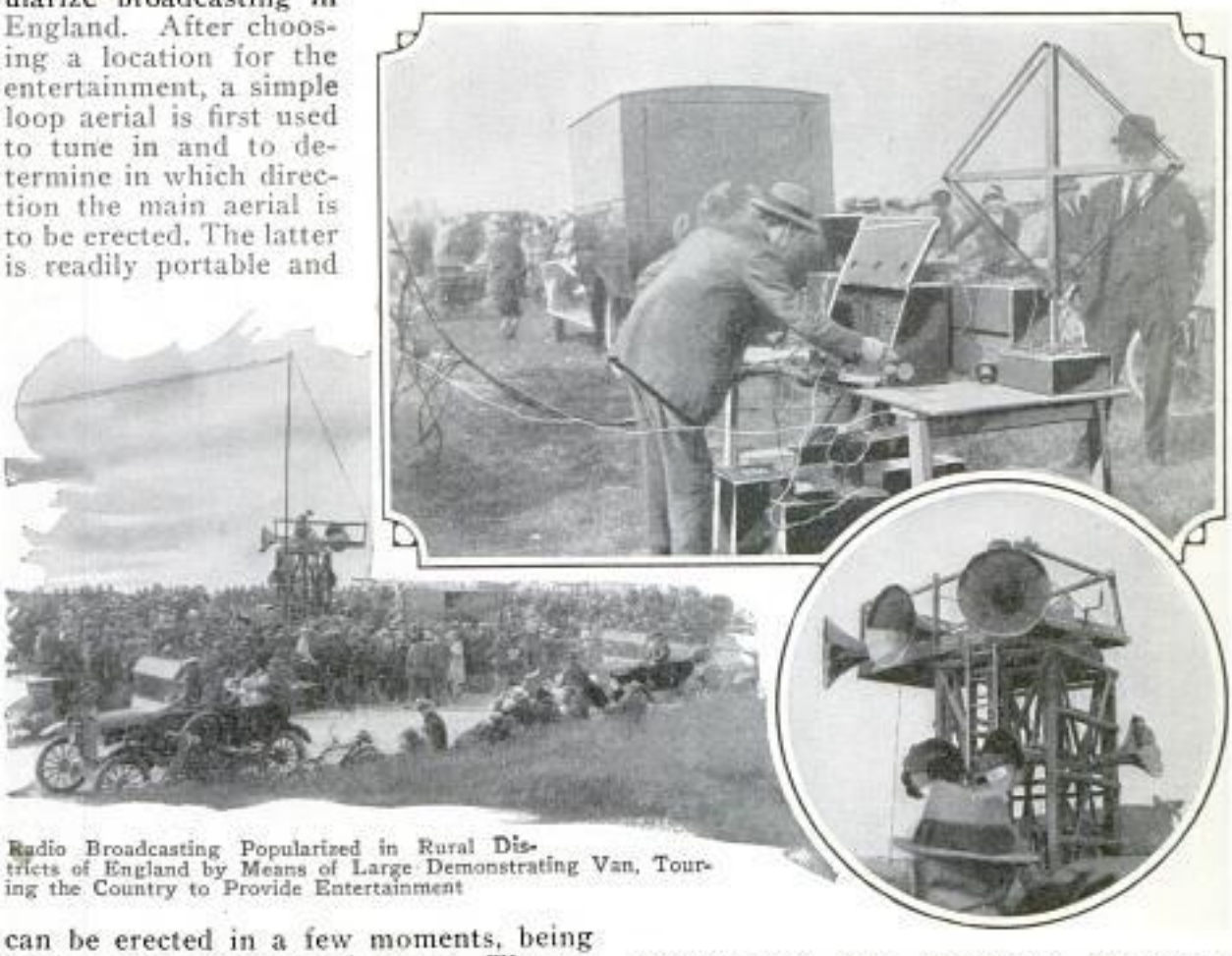


Special Tools for Radio Work Have Wide Range of Usefulness

used in radio work, a countersink, a reamer and a wrench for square and hex-agon-head nuts, are also provided. The same manufacturer also has introduced a special hand drill for radio work. This is small, but powerful, and the chuck will take a 3/32-in. drill.

Popularizing Radio in England

TOURING from seashore to seashore, through country hamlets and villages, a large motor van equipped with the latest radio apparatus for giving open-air demonstrations has done much to popularize broadcasting in England. After choosing a location for the entertainment, a simple loop aerial is first used to tune in and to determine in which direction the main aerial is to be erected. The latter is readily portable and can be erected in a few moments, being held on telescoping steel masts. The set used has eight tubes so that the signals can be amplified sufficiently for the satisfactory operation of a number of loud speakers, which, in this particular instance, were mounted on a trolley-inspection platform on an electric-car line, as illustrated. The parts carried along in the motor truck are collapsible so that they can readily be stored in a small space. The interest aroused by this method can be inferred from the size of the crowd shown in one of the photographs.



Radio Broadcasting Popularized in Rural Districts of England by Means of Large Demonstrating Van, Touring the Country to Provide Entertainment

Sixteen Fire Companies Run for Radio Audience

All the thrills of sixteen fire companies speeding to an imaginary burning building, together with the official commands and sounds incident to a big fire, were broadcast by WDAF a short time ago. The entire equipment of the Kansas City, Kans., fire department was used in staging a performance especially for the radio audience. It marked the opening of fire-prevention week.

The fire run was arranged and planned by Elmer E. Scott, state fire marshal of Kansas, and John McNarrey, fire chief. Special microphones were placed in the fire headquarters and special lines carried all the incidents of the performance to WDAF's radio transmitter.

Chief McNarrey was heard discussing the apparent fire hazards with the owner of a building he had just inspected, when smoke was detected. In the distance the siren and gong of a fire truck were audible. The listeners-in heard the apparatus approaching. By that time the imaginary fire had developed such proportions that a second alarm was turned in and later a third alarm.

One company after another was heard until the entire force was on the ground. There were audible all the commands a chief usually gives at a great conflagration, the shrieks of women in upper windows and the rescue commands; pumps at work; jumping into nets; the crash of walls collapsing and other sounds that are common to a great fire.

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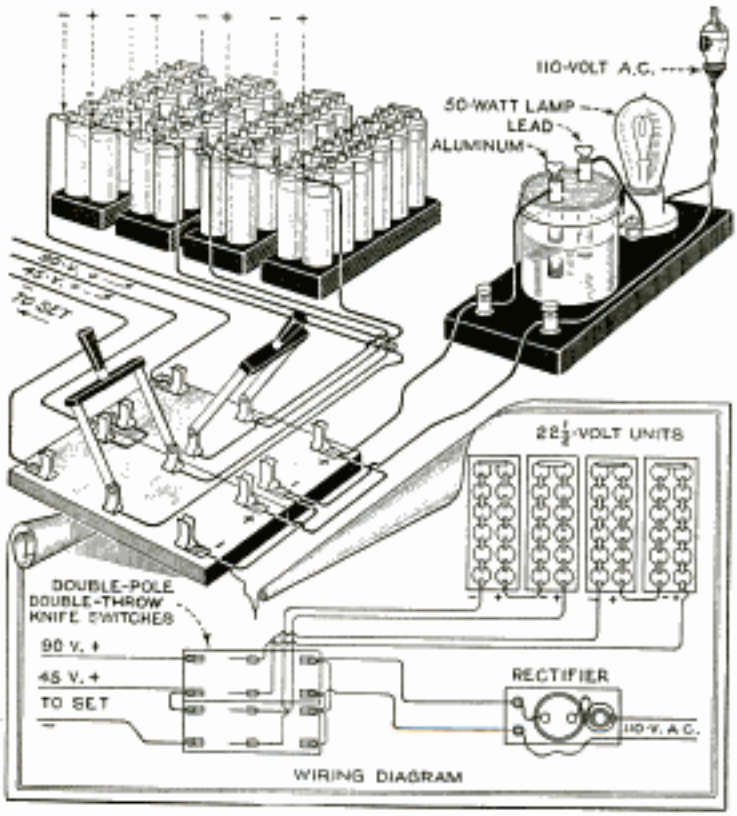
Cmt. Edwin J. Bachman
Box 57, Fullerton, Pa.
307-R

Charging Switch for Storage B-Batteries

Manufacturers of storage B-batteries recommend that not more than three 22½-volt units in series should be charged at once on 110-volt house-lighting current.



Storage B-Batteries Quickly Charged on 110-Volt House-Lighting Lines by Connecting Units in Series-Parallel Using Two Switches

The reason for this is that the counter-electromotive force of the combined cells will be greater than the supply, which is already reduced by the resistance of the lamp and the rectifier, and it will take too long to bring the cells up to normal, if this is possible at all. As most loud-speaker sets require a plate battery of from 90 to 100 volts, this means that only one-half of the cells should be charged at a time. It is possible to charge the whole set, however, by connecting the cells in parallel and using a 50-watt lamp instead of a 25-watt lamp as a resistance for the rectifier. This will permit more current to flow and insure an equalization of the remaining charges in all the cells, which takes place immediately after the cells are connected in parallel and before the charging current is turned on. When the charging begins, both units will receive the same amount of current. This is important, as the amplifiers take current from the whole set but the detector uses only half; consequently this half needs a compensating charge, and gets it from the other cells. Two double-pole, double-throw knife switches are recommended, although a four-pole switch, or four single-pole, double-throw switches can be used. The connections are clearly shown in the wiring diagram. To place on charge, the switches are thrown to the right and may be left this way overnight. Throwing them to the left disconnects the charging current and puts the batteries into the radio circuit.

Using a Variable Condenser

A variable condenser is commonly used in radio circuits, but very often wrongly connected. It may be placed in the aerial circuit, either in series with the primary tuning coil or shunted across it; in the plate circuit as a control for regeneration, and in the grid circuit as a control for tuning, across the secondary of the tuning coil. In the first case, the rotor plates should be connected to the ground; in the second to the B-battery, and in the third case to the A-battery. By applying this rule squeals and howls in single-circuit receivers are eliminated, and body-capacity effects reduced in all kinds of circuits. Vernier variable condensers are necessary where tuning is critical. A vernier control can be added to any variable condenser by connecting a three-plate variable condenser in parallel with it. This will serve as a vernier to the larger condenser and give fine tuning control.

1740a

Handy Multiple Binding Post

For the electrical experimenter or radio worker a spring binding post of the kind shown in the illustration will prove convenient; it is easy to make and costs practically nothing. Staple a brass coil spring, bent around to a circular shape, to a wooden base as indicated. Any number of terminals can then be inserted between the coils of the spring. Such a multiple binding post is handy for connecting several headphones to the radio receiver.—L. B. Robbins, Harwich, Mass.

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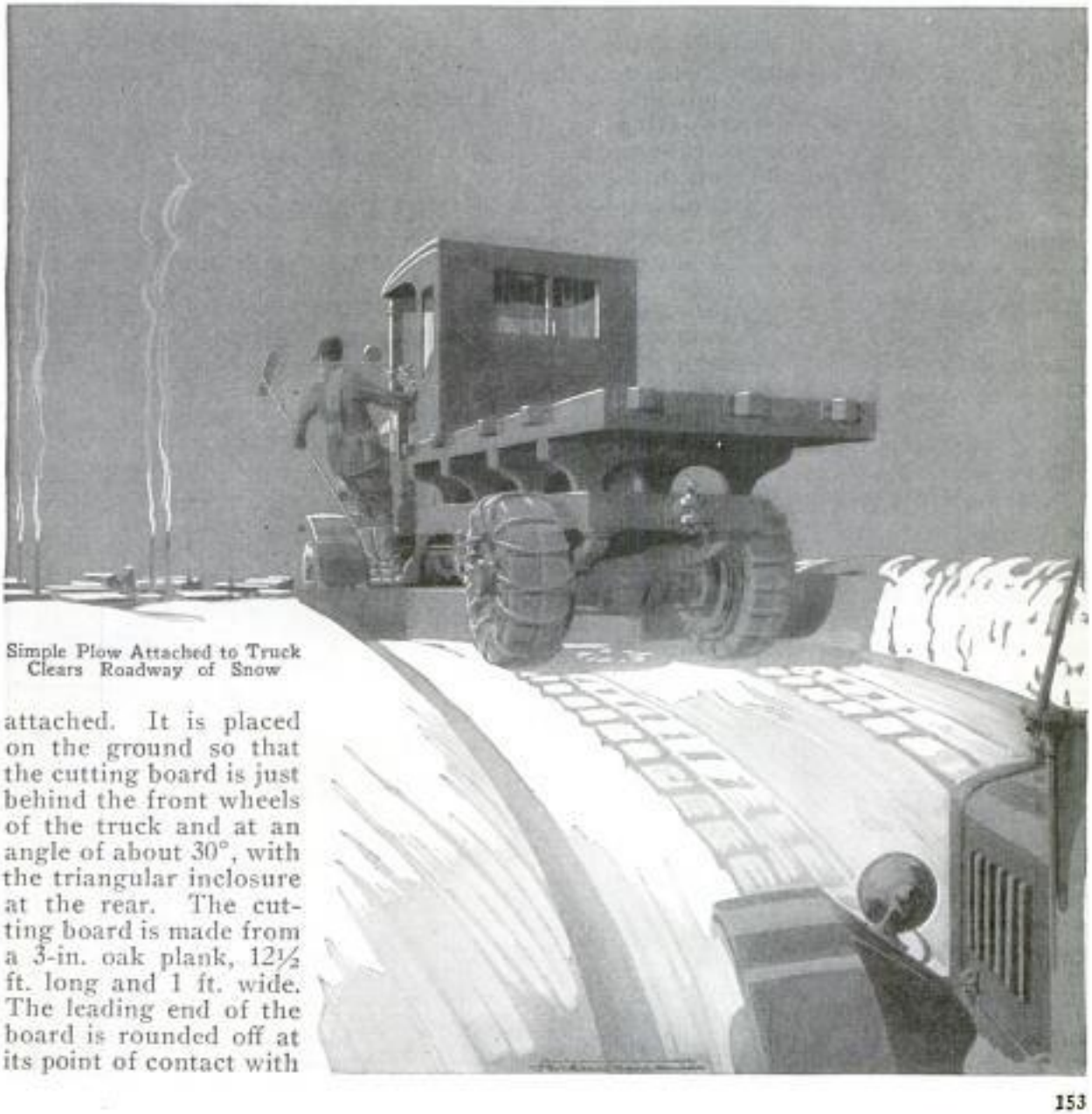
Detachable Snowplow for Truck

By A. C. COLE

AN eastern truck owner, finding it necessary to keep the roads open so that he could maintain his schedules, built a snowplow for one of his trucks that functioned admirably.

This plow consists of a front, or cutting, board to which a triangular ballast box is attached. It is placed on the ground so that the cutting board is just behind the front wheels of the truck and at an angle of about 30°, with the triangular inclosure at the rear. The cutting board is made from a 3-in. oak plank, 12½ ft. long and 1 ft. wide. The leading end of the board is rounded off at its point of contact with the ground. Two chains are fastened to rings on the front of the cutting board and run to the towing hooks at the front of the truck frame, the right chain going to the right hook and the left to the left. It should be borne in mind that these rings should be located on the centerline



Simple Plow Attached to Truck Clears Roadway of Snow

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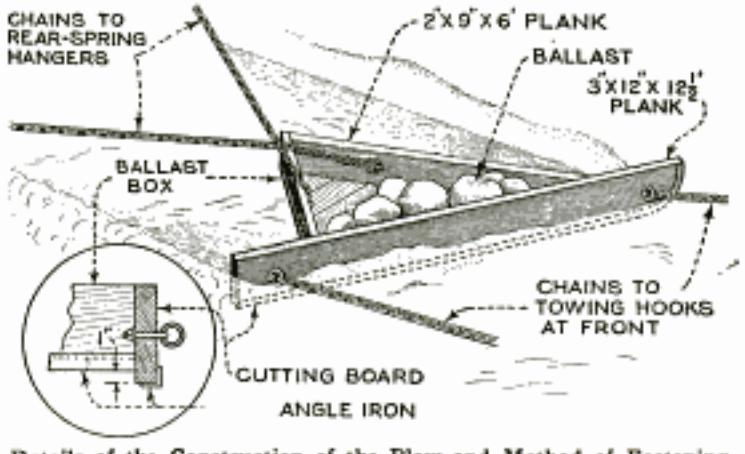
of the board, or 6 in. from each edge. The left chain, looking forward, is spaced 3 ft. 3 in. from the end and the right chain 2 ft. 9 in. from the end. To protect the cutting board, the lower front edge is faced with 2-in. angle iron, as is also the lower edge of the triangular inclosure, the sides of which are 6 ft. long. This triangle is provided with a floor that is raised about 1 in. from the ground, in order to prevent friction and damage, and so that, if necessary, the box may be filled with ballast. On the inside of the triangle, and on the centerline of the sides, two iron rings are provided for chains similar to those in front. These chains are crossed, the chain on the right being brought over and fastened to the spring hanger on the left side of the truck and the left chain taken over and attached to the right spring. This crossing of the chains holds the plow in position and also permits the vehicle to be backed without damage. The chains should be heavy, as breakage might cause more or less damage to the truck. For safety's sake, and to avoid sudden shocks, heavy springs should be attached to the front chains.

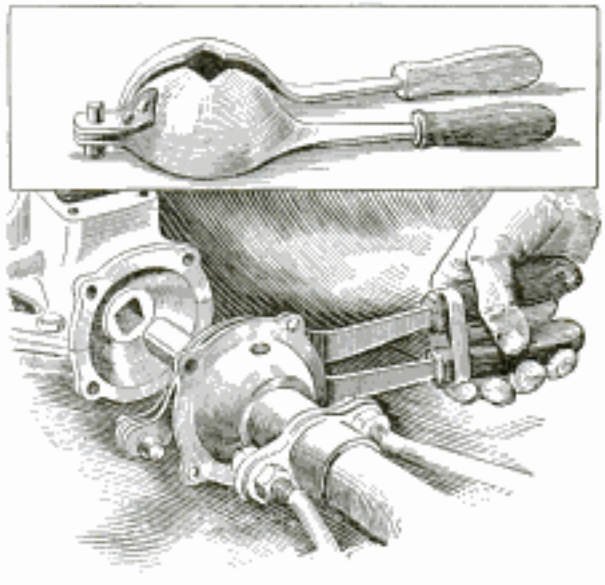
In operation, the plow is placed underneath the truck and the chains secured as described. It pushes the snow to one side and allows the vehicle to pass over practically bare ground. If the snow is packed hard the plow will not cut it, but will level off the surface, leaving a smooth roadbed of packed snow over which the trucks can travel easily. When this begins to thaw, another pass of the plow will cut away the snow and slush. The total cost of such a device does not exceed $50 and its size will, of course, depend on the dimensions of the truck with which it is to be used.



Details of the Construction of the Plow and Method of Fastening It to Truck

Tool for Inserting Universal Joint

When replacing the rear-axle unit of a Ford transmission difficulty is often encountered in guiding the square end of the universal joint into the hole in the driving unit. This is especially so when one attempts to do the job alone, as the shaft end has to be held in alinement with the driving unit, and turned so it will fit the hole in it, while at the same time the rear-axle assembly must be pushed forward. The first two operations can be done with one hand by using the tool shown in the drawing. It is made of two pieces of ⅛-in. steel, made cup-shaped to conform to the curvature of the universal-joint ball. At the center of the cup portion a notch is cut in each so that when the tool is applied these notches will grip the axle firmly. The two pieces are hinged at one side, as shown, by means of extra lugs and a pin, which should be removable so that the two "jaws" of the tool can be separated and taken off after the transmission has been assembled. Handles, flat on the adjoining sides, are fitted to the ends as shown. A strong rubber band may be stretched over the two handles to help hold the tool clamped to the shaft, and it is then an easy matter to turn the square end to the correct position.



Simple Tool for Holding Universal Joint While Replacing Rear-End Assembly

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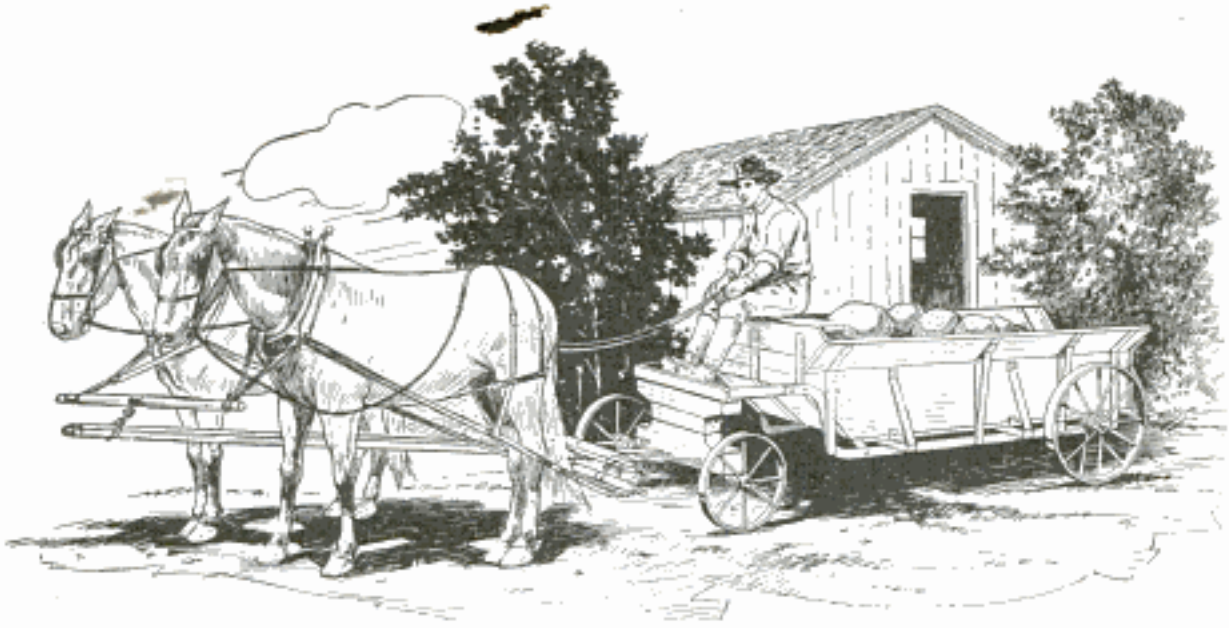

Wheeled Stone Boat, Made from Parts of Old Binder and Old Lumber, That Has Given Its Owner Good Service for Several Years

A Four-Wheeled Stone Boat

The stone cart shown in the drawing was made almost entirely from salvaged binder parts and old lumber. Most of the weight comes on the rear wheels and the whole clearance from the ground does not exceed 6 in., so that loading of stone is quite easy. The rear end is entirely open, while the extended sides permit a larger load to be carried when something else than stone is to be hauled. Thus, it may be used to haul posts for repairing fences, and grain, baled hay or manure. The wheelbase is only 7 ft. and the front wheels are small enough so that the cart can be turned around squarely. The frame is rigid, yet light. A cart of this kind has been in use for several years and is still as strong as ever.

Fitting Oversize Pistons

In overhauling an automobile engine it was found that the first oversize pistons were a trifle too large for the cylinders, as was proved by the fact that one of them had to be broken to remove it after it had been forced in. Lapping of the cylinders was accomplished in the following way: The block was immersed in boiling water and one of the pistons was chilled in ice water, chucked on a lapping head in the drill press and the outside covered with abrasive. It was found that the cylinder wall had expanded and the piston had contracted enough to admit the latter. After the lapping was completed, the piston fitted nicely in the cylinder when the temperature of both was normal. The same method of expansion and contraction can be used to remove a stuck piston. Ice water is poured into the piston and the block is heated with warm water; this will, in most cases, permit the piston to be forced out.

Checking Oil Deliveries

When delivering oil to small dealers from trucks, it often happens that the delivery man sells only 25 or 35 gal., which he takes out of a 55-gal. tank. When doing this it is very easy to forget how many 5-gal. cans he has filled and poured. This possibility one oil company prevented by putting a wire on the truck as shown in the drawing, and slipping 10 or 12 washers on it so that the cans of oil delivered can be counted by shifting the washers over one by one.—W. L. Kaufman, Santa Ana, California.

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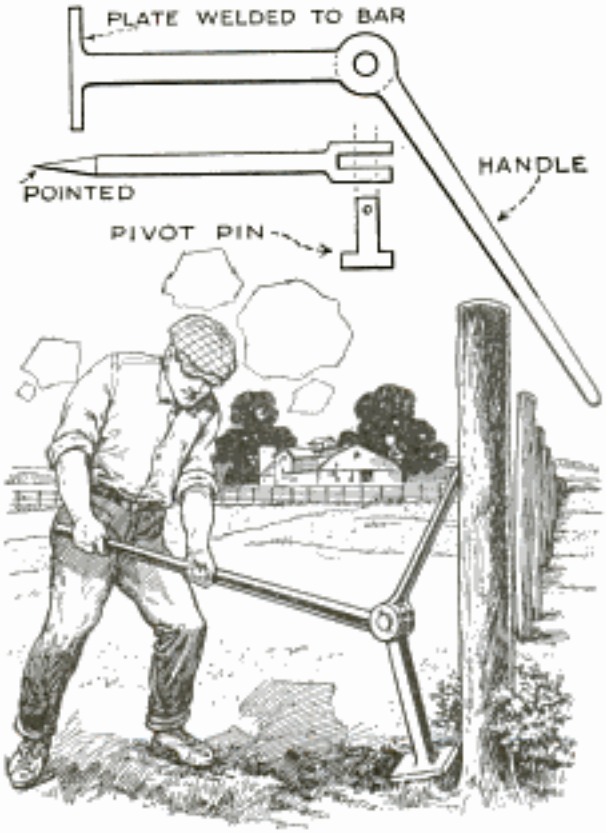
Effective Post Puller

Farmers, and others who have frequent occasions to pull posts, will find the device shown in the drawing effective for doing this work. It is portable and can easily



Homemade Post Puller Is Portable and Can Be Operated by One Man

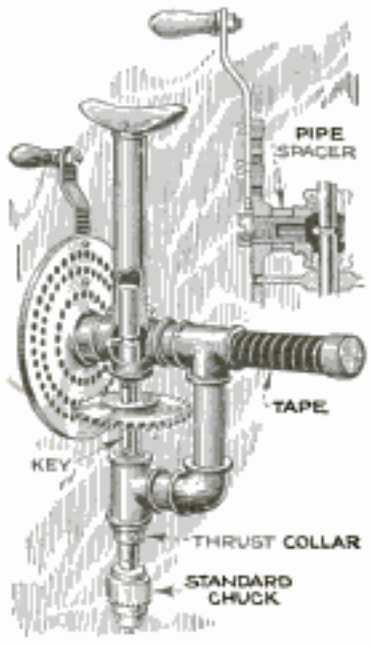
be operated by one man. The upper details clearly show its construction. It consists of two parts made of heavy bar iron. The lower part and the handle or lever are integral, being bent to the shape shown and the elbow flattened and drilled to receive a pivot pin. A plate is welded on to serve as a foot. The upper part is forked at one end to straddle the flattened elbow and is pointed at the other end to grip the post. In use, the device is set in the position indicated and the lever is pulled upward, which causes the post to rise.

Cleaning Ford Spindle-Bolt Oilers

The oil cups on Ford spindle bolts are easily clogged by dirt, and lack of oil then allows the parts to wear quickly. The best way to remove the dirt is, of course, to take out the bolt and clean out the dirt from both ends of the holes with a wire. However, they can sometimes be opened quickly by filling the cups with oil and then driving a pin punch or nail down into the opening, which is about 3/32 in. in diameter. The punch is removed, the cup refilled and the operation repeated until the hole is opened. If the dirt is too hard to be loosened by this method, a twist drill of 3/32-in. size is greased and drilled into the dirt until the bottom of the hole is reached. The drill is then removed, the cup filled, and the punch used as described above. The drill will remove most of the dirt in the upright part of the hole and the punch and oil will then force out the dirt in the cross holes. To forestall trouble of this character, it is advisable to install alemite couplings on the bolts, and use the regular gun for lubrication.—E. T. Gunderson, Humboldt, Iowa.

Homemade Breast Drill

A great deal of pleasure and satisfaction is gained by constructing one's own tools. In doing this it is not necessary to go to the expense of having patterns made, as can be seen by examining the drawing of a homemade breast drill, which was made almost entirely of ¾-in. pipe and fittings. The main connection is a cross, which acts as a support for the plate gear, spindle and handle. The spindle is made from a piece of ⅜ or 7/16-in. cold-rolled steel rod. A retaining-pin groove is turned in the position shown and a hole drilled through the body of the cross in such a position that the pin fits in the groove; this pin prevents the spindle from dropping out. A collar is either pinned or turned on the spindle at the lower end to take the thrust, and a taper or straight end is provided, depending on the chuck to be used. A key is fitted on the spindle to hold the pinion. The pinion on the spindle has a number of pins screwed into tapped holes, which are spaced at equal distances around the rim. The disk gear is flat and is fitted with an adjustable handle fastened on with screws. The disk is provided with three rows of holes to give



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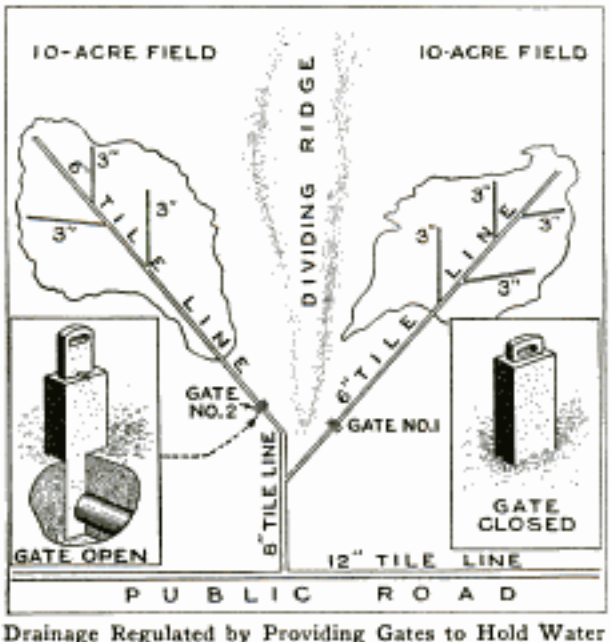
three speeds, these holes being spaced to correspond with the pin spacing on the spindle gear. A short nipple, screwed into the cross and long enough to serve as a support for the large disk, is tapped at the outer end for a large-head machine screw, which holds the disk on. A shorter nipple is provided over the first nipple to serve as a spacer. The cross and tee through which the spindle passes can either be babbitted or small brass bushings provided to serve as bearings; brass bushings would, of course, make the best job. The handles of the drill are made according to the drawing.

Fluid for Bleaching Blueprints

I keep a small bottle containing a strong solution of M-Q developer on my drafting table for making small changes on blueprints. The solution is used in a pen just as ordinary ink. It bleaches the blue so that the change cannot be distinguished from the lines on the original print. I have found this method much more satisfactory than any other, as it is simple and much neater.—Neil Nelson, Kansas City, Mo.

Regulating Drainage of Land

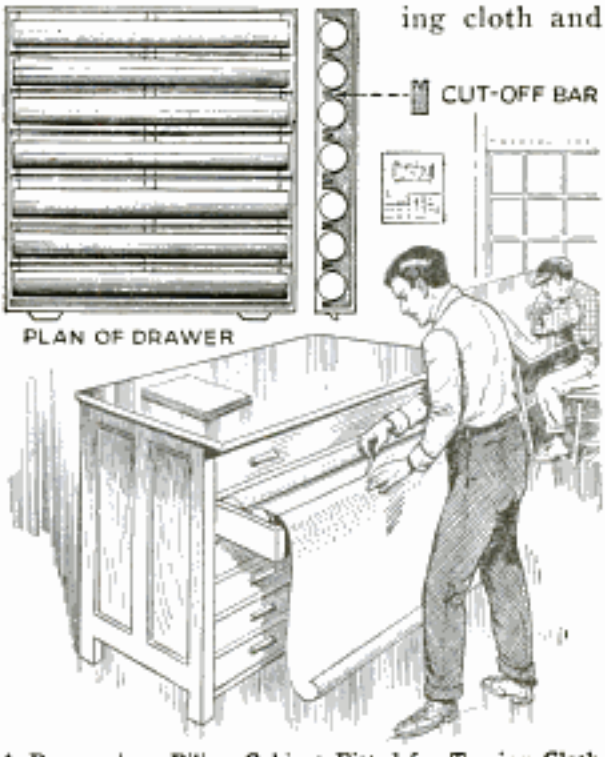
Few crops are able to stand under water for any length of time without serious loss. Still there are many farms that do not have an adequate drainage system, although many have a main drain. A good method of regulating the drainage is shown in the illustration, the main drain being fed by two or more smaller drains, which can be closed by means of gates provided at the points where they enter the main drain. By closing the gates of the smaller drains, the water of a heavy rain can be held back in any section of the field until the low land around the main drain has been relieved of excess water. This will keep the low land from being flooded.—A. Bain, Toledo, Ohio.



Drainage Regulated by Providing Gates to Hold Water Back in Branch Drains

Adapting Filing-Cabinet Drawer to Hold Tracing Cloth

The accompanying illustration shows how a filing-cabinet drawer was adapted to hold tracing cloth and paper in a very convenient manner. Brackets, made of wood, were fitted to the ends and center of the drawer, and cut out to hold the rolls of paper and cloth easily. Between the rolls, and running lengthwise of the drawer, cut-off bars were fitted. These consisted simply of strips of hardwood, each with a groove cut in it in which the knife-edge fitted when cutting off the paper or cloth. It is not essential that each roll be fitted with a cut-off bar, as slots can be cut in the brackets into which the bar will fit, and the bar simply shifted in front of the roll from which a piece is to be cut. With this arrangement, the stock is kept in a clean and orderly manner, and there is no waste in cutting.



A Drawer in a Filing Cabinet Fitted for Tracing Cloth Keeps the Stock Clean and Saves Waste

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Simple Gate Stop

In trying to make a stop for a swinging gate which would prevent live stock from escaping, the device shown in the photo

Convenient Gate Stop Prevents Live Stock from Escaping

proved satisfactory. A piece of 2 by 4-in. wood, about 3 ft. long, was hinged to the gate about one-third of the distance from the top. Any pressure applied against the gate from the inside causes this piece to dig into the ground and hold the gate shut securely. The gate can be opened as wide as desired by merely lifting the stop by means of a rope, attached as shown, and in this way it is possible to take one animal out without letting the others escape.

Handy Twine Holder

It is rather unhandy to have a ball of twine on the composing stone in a printing shop, because it is easily knocked to the floor, where it may roll out of sight. A simple twine holder of the kind shown in the illustration, which is placed on the floor beside the stone, will eliminate this trouble. A flat piece of wood, about 7 in. wide, 10 in. long and ¾ in. thick, forms the base. Two uprights, 24 in. high, are fastened to it and joined together at the top by a strip 5 in. long. In the center of the base block a piece of round wood, about 8 in. long, is nailed to hold the spool of twine. The end is threaded through a small hole drilled in the top crosspiece. This holds the twine within handy reach and the substantial mounting is not easily upset.

Cheap Aluminum Paint

Banana oil, which is commonly used in mixing up aluminum paint, is far too expensive to justify its use for extensive exterior work. A jeweler, however, wishing to cover his store front in aluminum, made a satisfactory and cheap paint of this kind without banana oil. Instead he used a solution of equal parts of boiled linseed oil, turpentine and spar varnish, to which was added a piece of gum arabic the size of a bean. These ingredients were heated together and then enough aluminum bronze was added to give the paint proper consistency and good covering quality. Besides having a soft, lustrous finish, this paint looms up well in the dark.—Bjorn Winger, Indianapolis, Ind.

Roadster Body on Railway Inspector's Car

Much comfort and convenience are added to the ordinary motor-driven railroad speeder by providing it with a Ford roadster body, as shown in the photo. An

Comfortable Inspection Car Built by Southern Railroad Superintendent

outfit of this kind has been put to service by the superintendent on a southern railroad, who found it necessary to be on the job in all kinds of weather. The car can attain a speed of 40 miles an hour, and is capable of carrying two passengers in front and four behind.—Duane L. Mohr, Coconut Grove, Fla.

¶Avoid striking one milling cutter against another, or any other hard substance that would cause nicks in the blades requiring considerable regrinding.

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A POWER-DRIVEN ICE HARVESTER

By F.D.Burke

MOTOR-DRIVEN ice-cutting machines are rapidly supplanting the old cumbersome horse-drawn type. These machines are much lighter, have a larger capacity, and have the advantage of being able to work on ice too thin to support a team of horses. Many of the machines have been built in the localities in which they are used, mostly from material that can be found around any garage.

The machine described in this article is simple, compact and light. Its weight will not exceed 350 lb. complete. It will cut ice as thin as it is profitable to harvest and up to 12 in. in thickness. Such parts as the 30-in. disk saw, shafting, pillow blocks and bolts can be obtained from any large mail-order house. The remainder of the material can generally be found locally. The power plant is a 2-cyl. motorcycle engine. This type of motor is light, powerful and economical of fuel and oil. A used motor in good running condition can be purchased from a motorcycle-supply house for $20 to $50, depending upon its age and condition. The motor base is a rectangular frame, made up of four lengths of 2 by 4-in. wagon stock, preferably oak. This frame is bolted together with ½ by 5-in. carriage bolts, the dimensions being as specified in the plan view, Fig. 2. The framework is mounted on two sled runners by means of ¼ by 1½-in. flat-iron supports. The motor is mounted on this frame in the manner indicated in Fig. 1. It is held in place by four sheet-steel brackets, made as shown in the detail drawing of the motor mounting. A motorcycle fuel tank is fastened directly above the motor. It is supported on a stand made of two lengths of ¼ by 1-in. flat iron. The tie straps that hold the tank in place are short strips of ⅛ by 1-in. band iron. Riveted to each end of the tie straps are 6-in. lengths of ⅜-in. cold-rolled steel rod. One end of each rod is flattened and holes are drilled for the rivets. The other end is threaded and fitted with a nut and washer. The tank is connected to the motor with the same tubing and fittings that were used on the motorcycle. As the motor will operate at constant speed when sawing, the throttle and spark advance will seldom be used. Therefore they can be mounted on the tank supports or in any other convenient location. On the rear end of the motor base there is

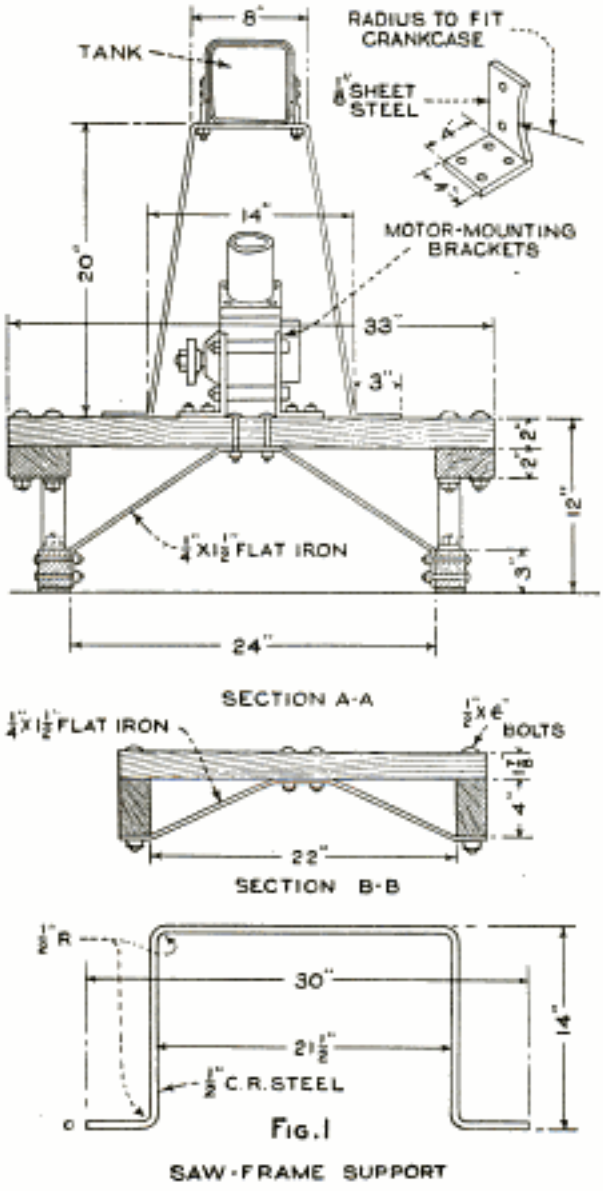

FIG. 1

SAW-FRAME SUPPORT

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mounted a 1-in. cold-rolled steel countershaft. This is supported in suitable pillow blocks in the manner shown in Fig. 2. One end of the countershaft projects beyond the motor base and is provided with a ⅜-in. pin for the starting crank. A removable crank is used on this end of the countershaft for starting the motor. Mounted on the countershaft, are two sprockets. As the saw runs at one-half of the engine speed, one of these sprockets should have twice as many teeth as the one on the crankshaft of the engine. This large sprocket should be keyed to the countershaft, in line with the sprocket on the crankshaft of the engine. Another sprocket of the same diameter as the engine sprocket should be keyed to the countershaft at the point indicated in Fig. 2.

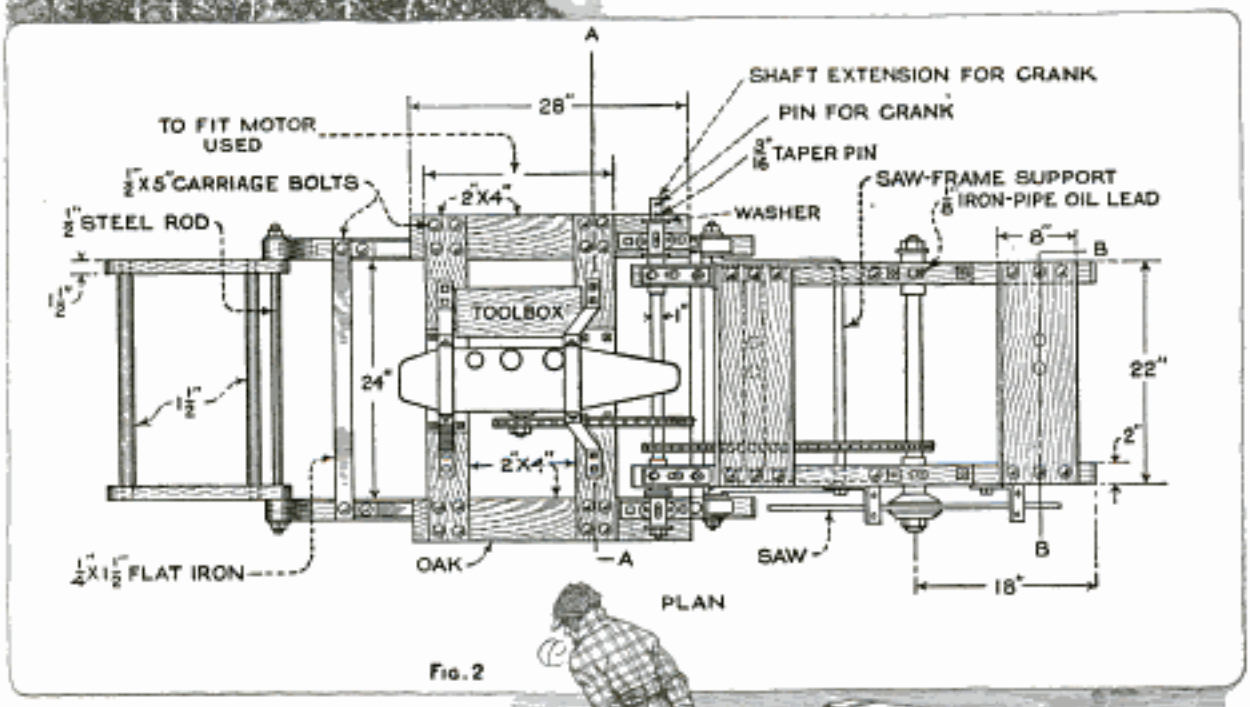
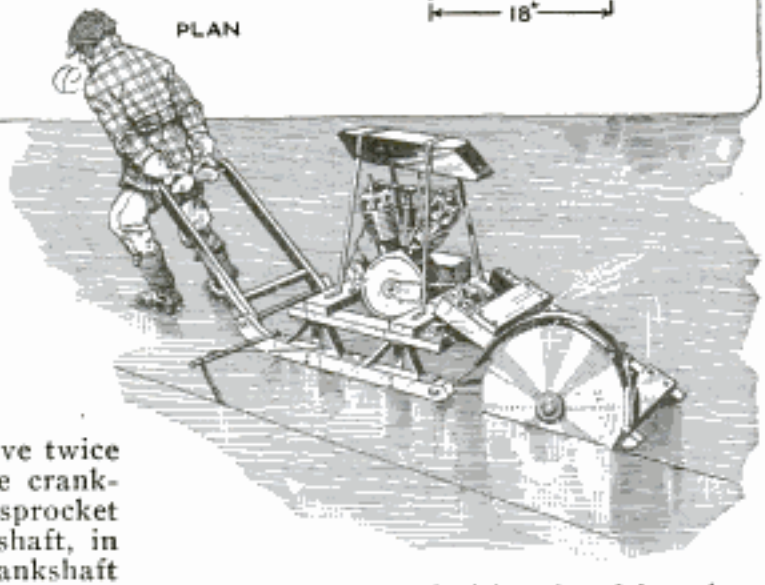


Fig. 2

The saw frame consists of two oak longitudinals and two crosspieces of the dimensions specified in Figs. 2 and 3. These members are bolted together with ½ by 6-in. carriage bolts. There are two flat-iron braces under each crosspiece, as shown in section B-B, Fig. 1. The mandrel or shaft on which the disk saw is mounted should be 1⅜ or 1½ in. in diameter, for a 30-in. saw. The shaft is carried in suitable pillow blocks which are bolted to the underside of the saw frame, as shown in Fig. 3. As the pillow blocks will be mounted in an upside-down position, the oil holes in them will be useless. In order to provide lubrication, holes should be drilled in the base of the pillow blocks (see Fig. 2). These holes should be tapped for ⅛-in. pipe. Holes should also be drilled through the longitudinals and 6-in. lengths of ⅛-in. pipe driven into them and screwed into the holes in the bottom of the pillow blocks. This will provide satisfactory oil leads. A sprocket of the same diameter as the one on the engine crankshaft should be keyed to the saw shaft, in line with the small sprocket on the countershaft. All the chain used



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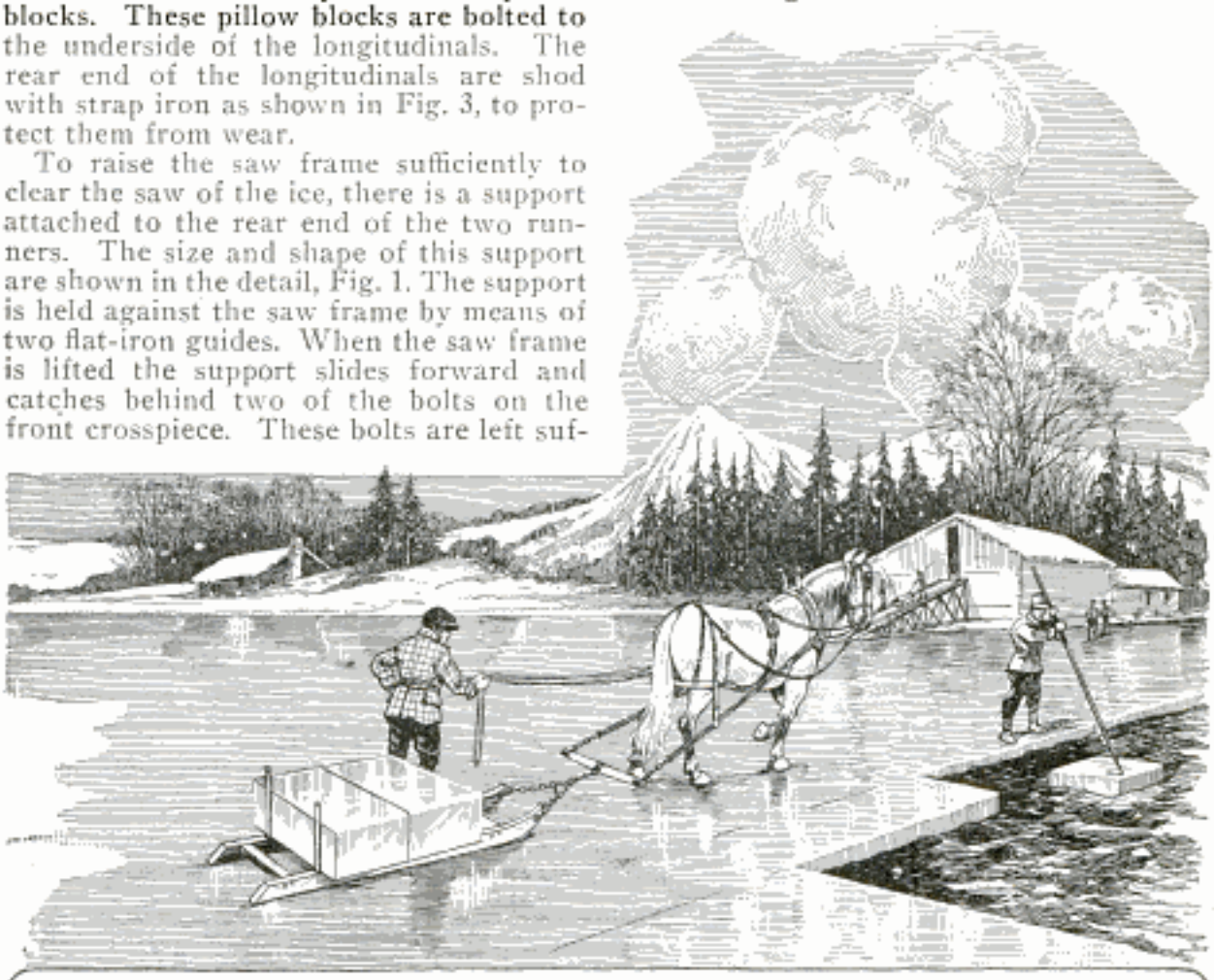
to connect the four sprockets should be the heaviest motorcycle chain obtainable. The front end of the saw frame is hinged to the countershaft by two 1-in. pillow blocks. These pillow blocks are bolted to the underside of the longitudinals. The rear end of the longitudinals are shod with strap iron as shown in Fig. 3, to protect them from wear.

To raise the saw frame sufficiently to clear the saw of the ice, there is a support attached to the rear end of the two runners. The size and shape of this support are shown in the detail, Fig. 1. The support is held against the saw frame by means of two flat-iron guides. When the saw frame is lifted the support slides forward and catches behind two of the bolts on the front crosspiece. These bolts are left sufficiently long for this purpose. A guard should be provided for the upper half of the saw. This can be an old motorcycle mudguard or one made up of heavy-gauge sheet metal. A short pair of shafts are attached to the front end of the runners (in the manner shown in Figs. 2 and 3) for handling the machine on the ice. The runners are of 1⅞ by 3-in. oak, 4 ft. long, and are shod with flat cold-rolled steel or iron. In starting the machine the saw frame should be raised with the saw clear



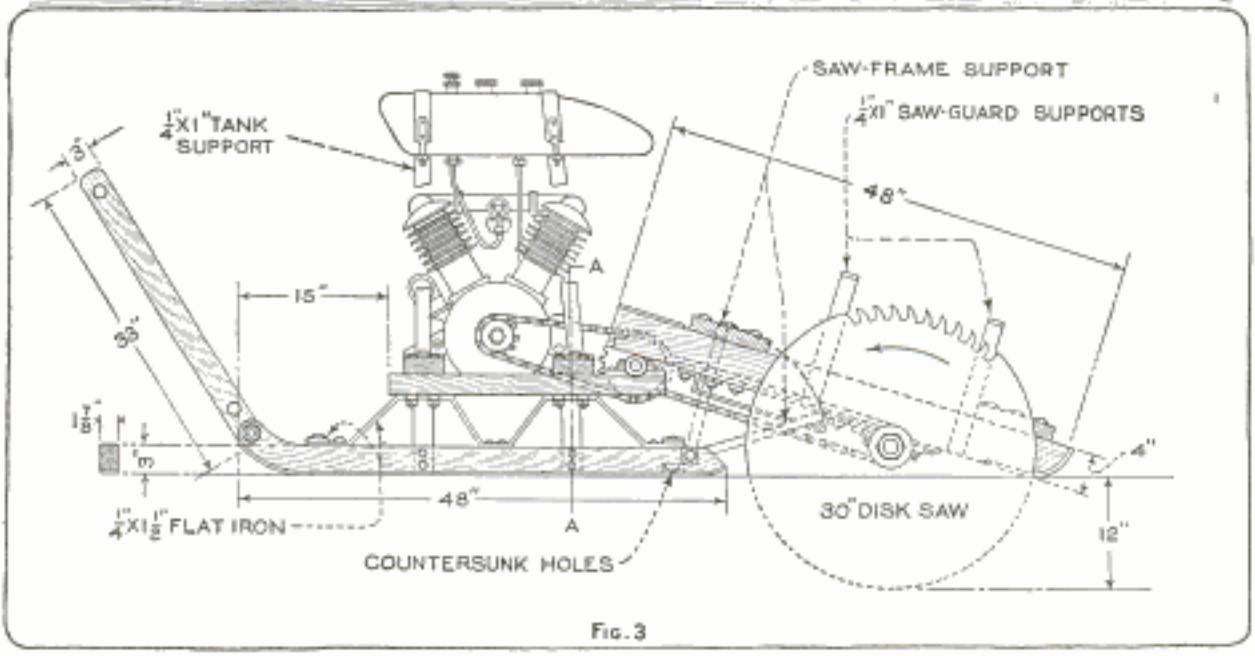


Fig. 3

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of the ice. The motor should be started in the usual manner with the spark well retarded. The operating speed of the motor should be 2,200 to 2,400 r.p.m. When this speed has been reached, the saw frame should be let down and the saw allowed to cut through the ice until the rear end of the saw frame is resting on the ice. Sufficient pull should be maintained at the front end of the machine to keep up the best cutting speed for the saw. A marker can be attached to one of the runners as indicated in the illustration below Fig. 2, to mark the width of the blocks to be cut, and keep them uniform.

Novel Derrick Mounting

A novel and satisfactory method of mounting a derrick was used by an eastern contractor, who, in building a skyscraper, had no space for derricks of the usual type, and was therefore forced to hang them on the sides of an adjoining building, as shown in the photograph. A short steel beam was bolted and lashed to one of the floor girders so that it projected about 4 ft. and the boom was hoisted up and lashed on this extension, so that it could be swung around easily. The hoisting rope was then threaded through the pulley of the boom and through another pulley fastened to a floor girder above the first, and was then run down to the hoisting drum.—J. L. Wright, Revere, Mass.

Novel Method of Hanging Derricks to Side of Building Where Lack of Space Prevented Use of Ordinary Derricks

Coatings That Prevent End Checks

Wood dries more rapidly from the end grain than from the side grain, and is apt to check and split during seasoning unless end drying is retarded by some means. For this reason it is advisable to use a water-resisting end coating on wood during air seasoning or kiln drying, especially on woods that are difficult to dry.

The coatings ordinarily used can be divided into two classes. The first are liquid at ordinary temperature and can be applied cold. The second are solid at ordinary temperature and must be applied hot. Cold coatings have the advantage that they may be used as easily on logs and lumber as on kiln samples and dimension stock; hot coatings, because of the method of application—end dipping—are not easy to use on large stock.

Either the cold or the hot coatings can be used effectively for drying temperatures up to 140° F. Temperatures much above this cause blistering in the cold coatings, but make the hot coatings plastic enough to form new surfaces as fast as the old ones break. For this reason the hot coatings are apt to be more effective than the cold coatings for temperatures from 140 up to 170° F.; at the latter temperature they liquefy to such an extent that they run off. No coating has been found that is entirely satisfactory for temperatures above 170° F. Cold coatings are perhaps somewhat better than hot coatings for temperatures above this temperature, and for use on kiln samples when the temperatures are high enough to cause the loss of part of a hot coating. Cold coatings to be effective should have about the consistency of heavy sirup. The amount of filler required ranges from two to four parts by weight to one of the vehicle. Cold coatings used at the Forest Products Laboratory have been found effective about in the following order, the most effective being placed first: Hardened gloss oil and air-slaked lime (oil evaporated to consistency of thin sirup

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before adding the lime); chinawood oil and barytes; linseed oil and white lead (very heavy); linseed oil and red lead (very heavy); high-grade spar varnish and barytes.

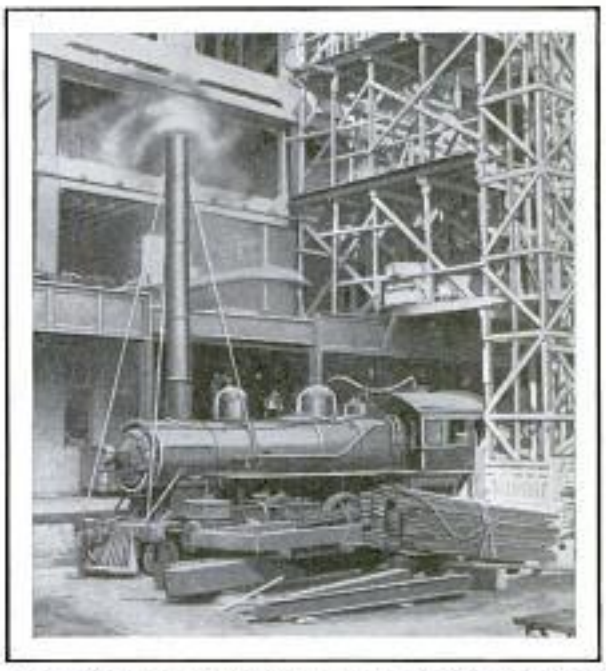
The hot dips were effective in the following order: 213-degree coal-tar pitch; 254-degree coal-tar pitch; resin and lampblack (100 parts resin to 7 parts lampblack).

Some asphalts are highly moisture-resisting, but they are hard to apply because of the high temperatures required to make them plastic. Paraffin has proved very satisfactory as an end coating for stock during air seasoning, but cannot be used in the kiln because of its low melting point. Excessive shrinkage of the wood and rough handling often cause the end coatings to chip or shear off, and a fresh application of the coating must be made. To reduce end drying sufficiently there must be a thick coating over the entire end surface.

Emergency Heating Plants

During the construction of an addition to a newspaper building in Chicago, the boiler that furnished steam for heating the old building, which is located directly behind the new one, had to be dismantled before a new boiler could be installed. To provide heat in the meantime, a locomotive was borrowed from a railroad and run up on its sidetrack along the building. Here the boiler was connected with the heating system, reducing valves being used to lower the pressure to a suitable figure.

Three Steam Shovels Take Place of Regular Boiler When Latter Is Not Available



Locomotive Furnishes Steam for Heating System of Large Chicago Building

A similar method was used in Detroit when it was found that the heating plant of a group of municipal buildings could not be completed before cold weather. Here three steam shovels were pressed into service. In both cases the smokestacks were lengthened.

Keeping Tools Out of Transmission

Anyone who has dropped a wrench, pair of pliers, or other tool into a Ford transmission while adjusting the bands, knows how difficult it is to recover it. Usually it slides down to the bottom, where it is practically impossible to reach it, unless one takes off the transmission cover, which is a long job. Many mechanics try to prevent such mishaps by tying a length of cord or wire to the tools, but this makes it rather unhandy to use them. A better method is to stuff a rag between the gears and the case so that all open parts are closed and the tools cannot fall through if dropped.—Ivan E. Houk, Denver, Colo.

¶To write black on glass or bright metal, use a mixture of water glass (silicate of soda), 1 to 2 parts, and liquid india ink, 10 parts. Clean the surface to be written upon and use a steel pen.

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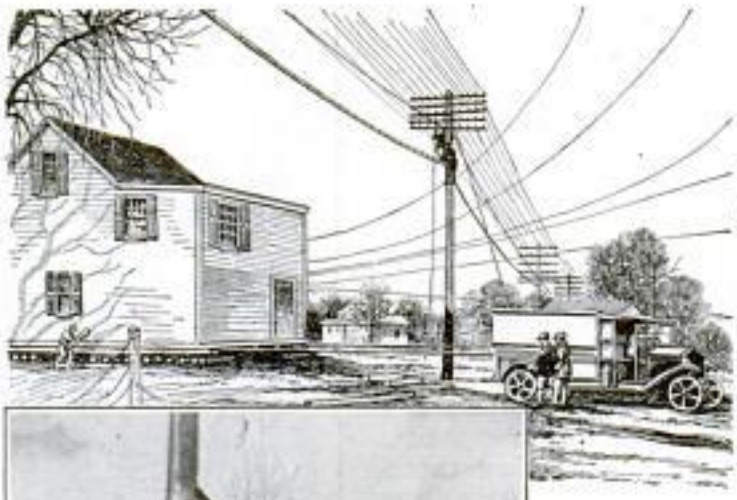
Moving Houses under Overhead Wires

Moving buildings from one location to another usually necessitates cutting down telephone and electric-lighting wires. However, in one case where a great number of wires interfered with the moving, it was found much more convenient and economical to hoist one of the telephone poles bodily out of the ground, thereby raising the wires and permitting the passage of the house. The work was done by the telephone company by means of a collapsible derrick mounted on a truck, as indicated. Wires attached securely to the crossarms of the pole kept it from tipping over, and after it had been raised, it was rested on the ground. Incidentally the work of moving the house was also hastened by using the truck's power winch instead of the hand winch employed before. Thus, the house was moved a greater distance in one hour than six men had previously moved it in two days.—A. W. Hill, Downington, Pa.



Telephone Pole Hoisted Bodily Out of the Ground by Derrick to Avoid Cutting Wires

Improving Marshlands

The amount of marshlands reclaimed for agricultural purposes by drainage operations is increasing rapidly all over the United States, especially in Florida, where extensive areas have already been brought under cultivation. Reclaimed marshlands have also been utilized in other states, especially for growing celery and onions.

The improvement of marshlands depends almost entirely upon proper drainage, because the high water level of these lands prevents the decay of organic matter to form plant food. Sometimes the construction of large ditches around a tract of marshland is sufficient to carry off most of the water from the surrounding higher land so that none of it runs on the marsh, and the result of this will naturally be the reduction of the amount of water on the marsh. This requires the dredging of large ditches, which is a work that may be accomplished by the co-operation of several neighboring farmers, or even by the community or the county. The best method to drain marshland thoroughly is to dig open ditches a short distance apart. The use of tile has many advantages over open ditches, but, as marshlands are usually extremely wet, at first the tiles will be forced up toward the surface, and they will then be ineffective. Tiling may be done later after the superfluous water has been removed and the soil has shrunk to its permanent condition. Drainage must be carried on gradually so that the soil will not dry too quickly, as its power of absorption is completely destroyed by rapid drying, and the decay of organic matter is retarded.

Marshlands that have an underlayer of coarse sand and a fibrous top coating are liable to be drained too much so that the crops grown on them may suffer from lack of water. The best method of increasing the water supply under such conditions is the construction of dams short distances apart in the larger ditches.

Temporary Pulley for Auto Generators

It is sometimes desired to test automobile generators by running them when removed from the car. In such cases the driving gear can often be converted into a pulley for temporary use by wrapping several turns of friction tape around it. The tape should be wound in the direction that the generator revolves.

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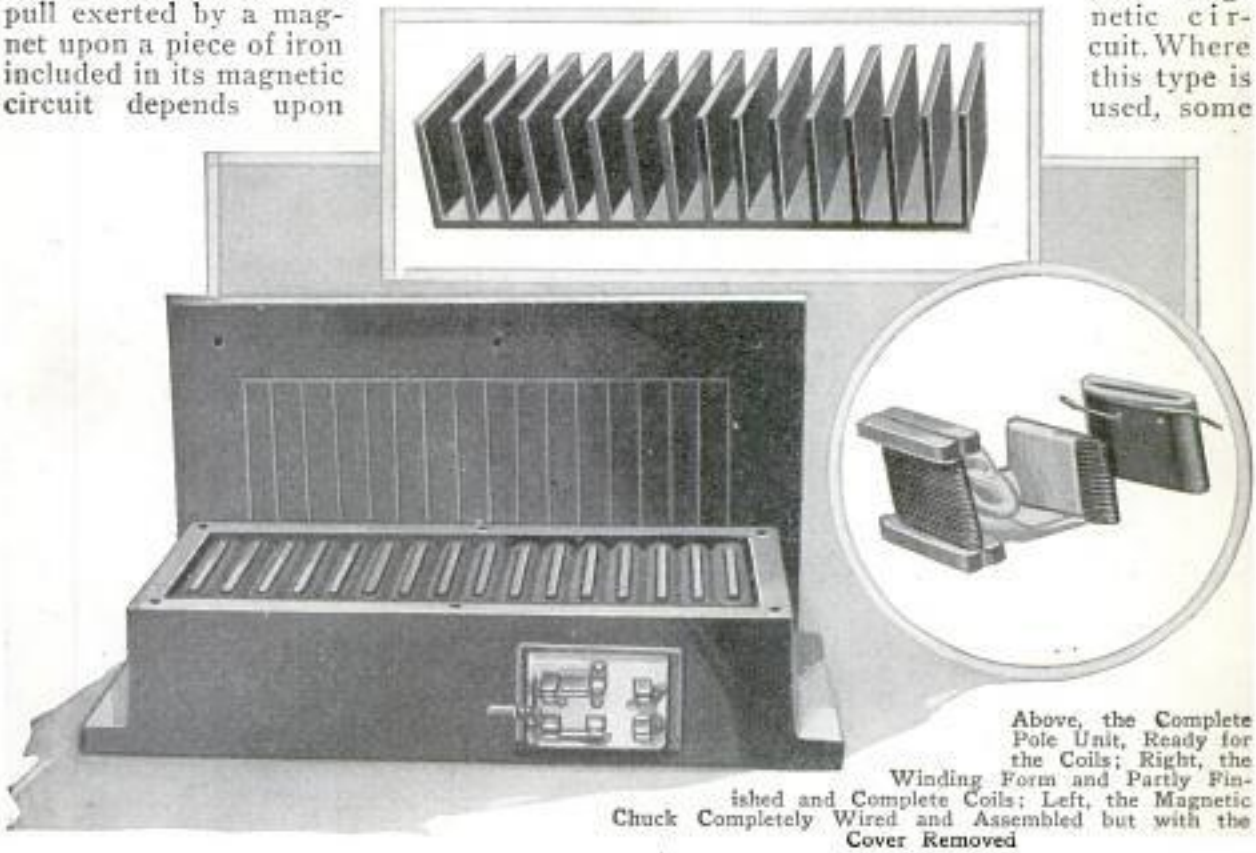
MAKING A MAGNETIC CHUCK

By A.F.Shaw

AN electromagnetic chuck, as its name implies, is a device for holding work to be machined by magnetism in place of the usual clamping methods. This device finds use on planers, millers and grinding machines. In this article the construction of a rectangular chuck will be considered.

Generally speaking, magnetic circuits of the closed-circuit type cannot be used where holding power is required. By leaving a gap in the circuit and allowing the piece of work to cover this and hence carry most of the magnetic flux radiating from the magnetic poles, great holding power is attained. The pull exerted by a magnet upon a piece of iron included in its magnetic circuit depends upon the flux and the area of the surface of contact. The magnetic circuit of this chuck is essentially a multiple horseshoe magnet with the work piece constituting the armature. The poles are alternately north and south and the metal to be machined is placed on the pole surfaces, thereby completing the magnetic path through the iron. Because of the fact that certain kinds of iron could not be obtained soft-steel castings were used. Cast steel has a high permeability (about 1,200) and is therefore very desirable for this work. The permeability of any material is the ratio of the magnetic flux in it to the flux which would exist if the material were replaced by air. This, then, is the material to be used for the pole pieces of the chuck.

There are two general types of chuck that can be constructed. The first one uses the body of the chuck to complete the magnetic circuit. Where this type is used, some of the flux passes through the tools of the machine as well as the base of the chuck, and magnetizes them, making them somewhat difficult to keep clean. In the second type, described here, the body of the chuck does not enter into the magnetic circuit at all. The pole pieces, although being in



Above, the Complete Pole Unit, Ready for the Coils; Right, the Winding Form and Partly Finished and Complete Coils; Left, the Magnetic Chuck Completely Wired and Assembled but with the Cover Removed

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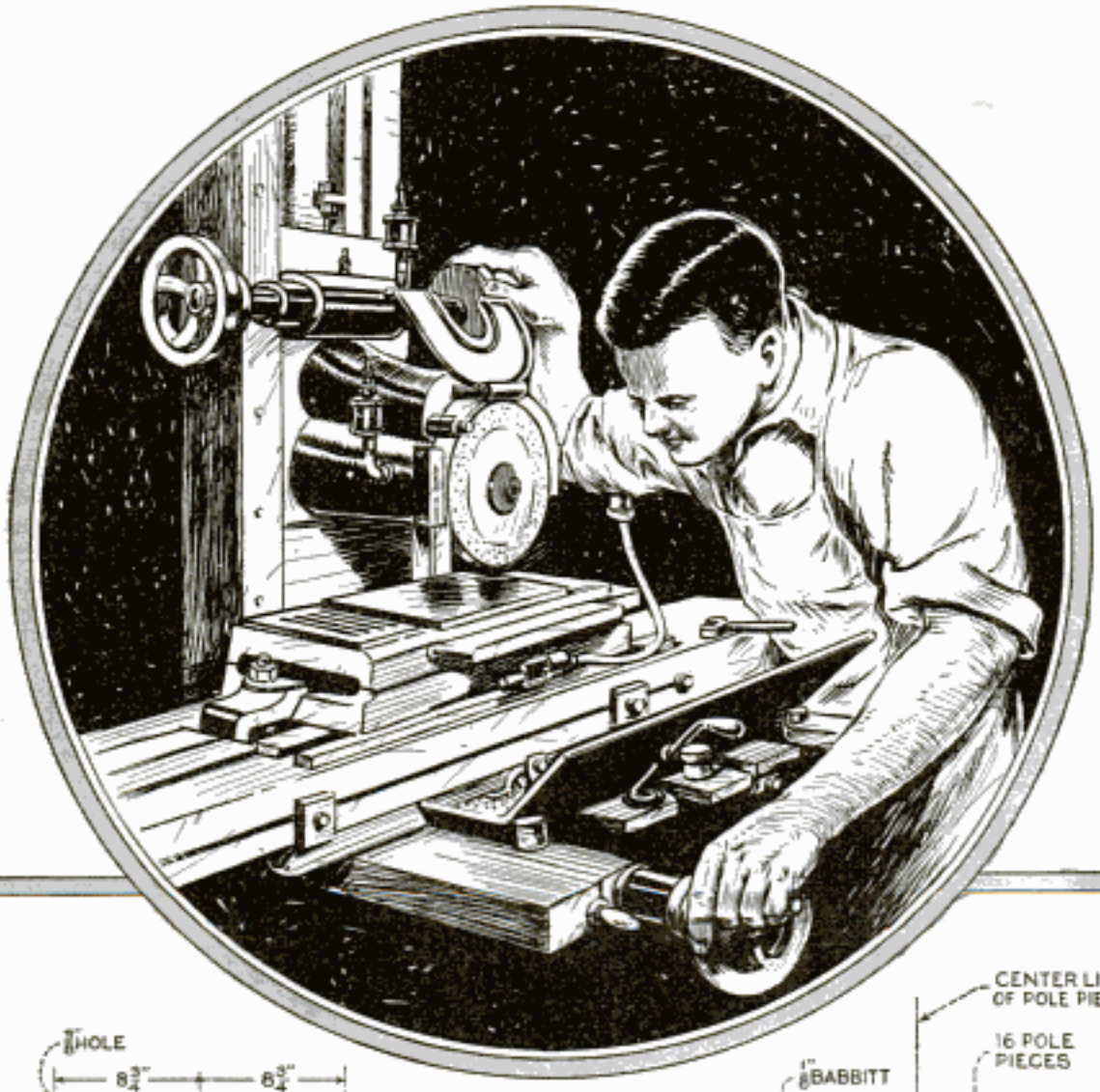

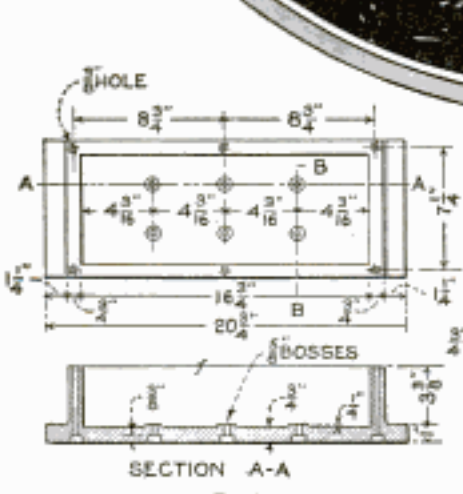

Fig. 1

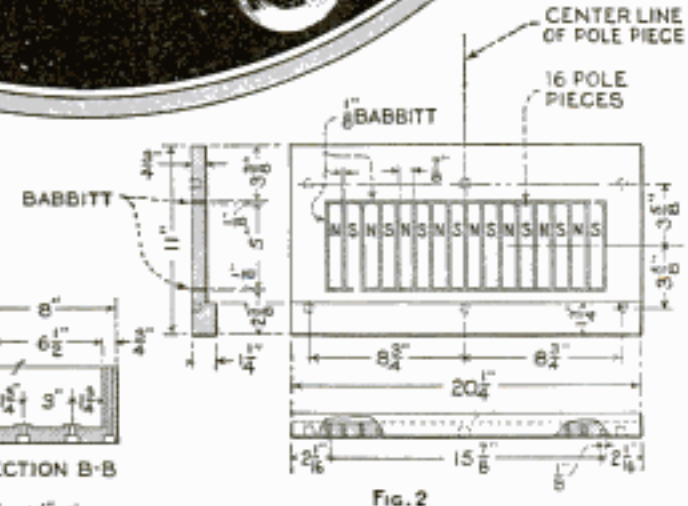

Fig. 2

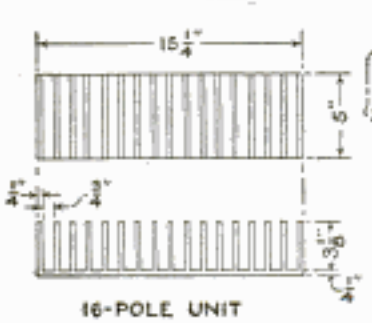

Fig. 4

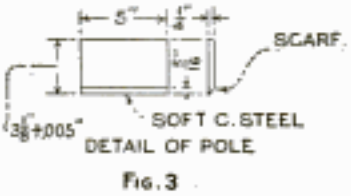

Fig. 3

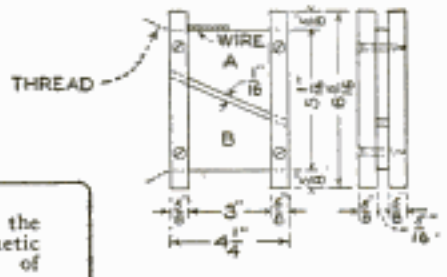

Fig. 5

Constructional Details of the Components of the Magnetic Chuck; Also Method of Winding Coils

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the cover of the chuck, are separated from each other and the cover by babbitt metal. This separating material, having a permeability practically equal to that of air, offers a large reluctance (resistance) to the passage of the flux. This means that the flux has a direct path from one pole, through the pole piece, through the work on top and down the next pole.

Since work pieces of different sizes will be held on the chuck, an average of work 2½ in. wide was taken for the calculations for this design. This means that with a flux density of 90,000 lines per square inch a pull of 190 lb. per pole can be attained. As the poles are placed close together and their combined pull is equal to the sum of their individual pulling power, it is evident that a very large holding power is available. The body of the chuck is made of cast iron, the drawing for which is shown in Fig. 1. The six long screws that go through from the bottom to hold the top plate on are placed around the sides as shown. These can either be made long enough to extend right through the top surface and then cut off or else the holes in the top plate can be made only part way through and tapped with a bottoming tap. These holes are shown in the drawing of the cover plate, Fig. 2. This plate is also of cast iron, using inserted pole pieces of the same material as the poles, soft cast steel. These inserts are made 5 by ¾ by ⅞ in. in dimensions. They are laid in place in the top cover and spaced ⅛ in. apart. Babbitt metal is now poured into the spaces between the poles, making the cover one rigid plate of metal. When completed it is finished off, preferably on the surface grinder.

The pole unit is next made. This consists of 16 soft cast-steel poles welded to a cast-steel plate or yoke. Each pole is made as shown in Fig. 3, with a beveled edge or scarf for welding. The poles are held to the plate forming the base with spacers and clamps and welded one at a time to form the unit shown in Fig. 4.

The coils placed on each pole consist of No. 20-gauge s.c.c. enameled wire. It is first necessary to make up, out of wood, the winding form shown in Fig. 5. By loosening the screws at the small ends of the sections, parts A and B can be slid apart, allowing the coil to be removed. In order to tie the coil when it is completed, and preparatory to taping, thread can be fastened under the edges shown before starting to wind on the wire. It will be found an advantage also to wrap a layer of thin fiber about the form before starting to wind the wire. Each coil has six layers, of 72 turns per layer, making a total of 432 turns per coil. Two leads are brought out from each coil, in sleeving, so that the coils can be connected in series later. There are 16 coils required in all, and each is finished by impregnating it with insulating varnish and then wrapping it with linen tape. It is only necessary now to assemble the coils upon the pole unit and connect them in series so that alternate poles are produced. Fig. 6 shows a scheme of connections with a reversing switch in place. This switch is used to demagnetize the work in order to remove it from the plate when it is completed. A compass and battery can be used to check the polarity of the poles in order to insure connecting them correctly. This particular chuck is giving very good service on a grinding machine at present.

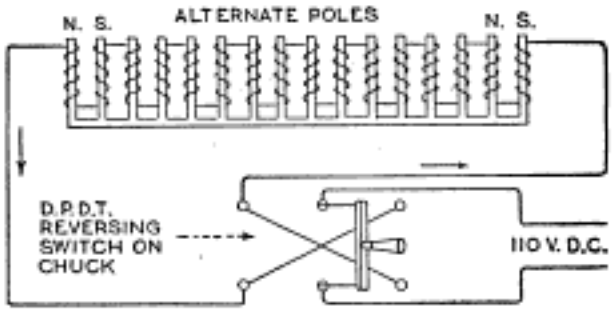

Fig. 6

Wiring Diagram for Coil Connections and Demagnetizing Switch

Holder for Oilcan on Machine

On many machines there is so much vibration that it is impossible to prevent the oilcan from falling off, making it necessary to provide a holder. One of neat design is shown in the illustration. It is made from a strip of fairly heavy galvanized iron, a trifle wider than the bottom of the can and bent as indicated so that the can will be held securely; it is fastened to a near-by wall or to the machine by means of two screws. An outward pull on the spout releases the can instantly. A strip cut loose in the bottom of the holder and bent upward to form a spring, as shown, not only helps hold the can more securely but also aids in dislodging it.—James E. Noble, Toronto, Ont.

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Double Grinder for the Farmer

Combining the emery wheel and the grindstone in the way shown in the drawing will save the busy farmer much time.

Combination Emery Wheel and Grindstone with Extra Treadle So That One Man Can Do the Grinding

Lengths of 1-in. pipe and fittings are assembled and attached to the grindstone frame, as shown, to make a solid support for an 8-in. emery wheel, which, together with a 4-in. pulley, is keyed to a shaft, and the shaft then mounted between two side-outlet tees. The pulley, which can be made of wood, must be in alinement with the grindstone so that a belt can be slipped over both, and the grindstone used as a flywheel. An extra treadle is provided on the frame for operating the emery wheel. —F. N. Coakley, Buffalo, N. Y.

C-Clamps from Axle Ends

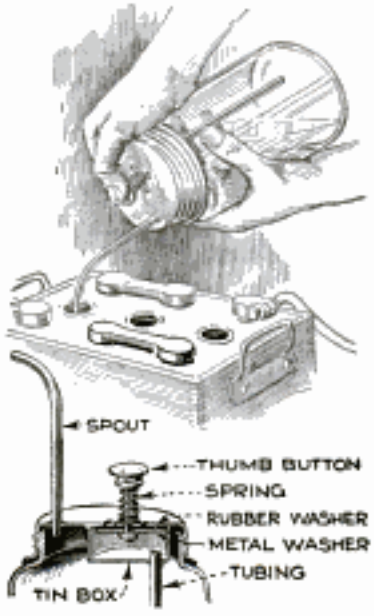
Useful C-clamps can be made from the ends of an auto axle by cutting it at the point shown by the dotted lines in the illustration, and providing a screw with a flange at the inner end and a "tommy" at the other. The axle should be cut with a hacksaw, not with an acetylene torch, as the heat reduces the strength of the steel.—Geo. G. McVicker, North Bend, Nebr.

Blotting Paper Substituted for Waste

The use of blotting paper for cleaning machinery is rather novel, but it has been found to serve well for this purpose. In one shop where 250 oz. of cotton waste and a new sponge cloth were used per week by each workman, blotters were introduced, and it was found that the amount of cotton waste was reduced to 150 oz. per man. Eight or ten sheets of blotting paper took the place of the remaining 100 oz. of waste and cost only one-third as much. In addition, the paper does not soil the machinery with fiber and dust as woolen refuse and sponge cloths do, and if caught in the machinery is easily torn off.—E. Tarrisse, Washington, D. C.

Filling Storage Batteries

Keeping the electrolyte of the storage battery at the proper level is an important part of the care of the car, but one that is very often neglected, due, in part, to the mussiness of the usual method of doing the job. A simple device that will make the job easier and quicker not only for the service station, but also for individual motorists, is shown in the drawing. The body or container of the filler is a common quart mason jar. The porcelain lining is broken out of the cap. Near one side of the cap a hole is drilled or punched that will pass an 8-32 machine screw,



and four smaller holes drilled around it at a 3/8-in. radius. Near the opposite side of the cap a hole for a piece of small copper or brass tubing is drilled. The valve mechanism shown in the detail is then made up. This is an 8-32 machine screw, with a 1-in. washer under the head, and a rubber disk 1 in. in diameter, cut from an old inner tube. This is slipped through the cap from below, a small spring put over the screw, and a washer and nut screwed on the end. A disk can be soldered to the nut to serve as a thumb but-

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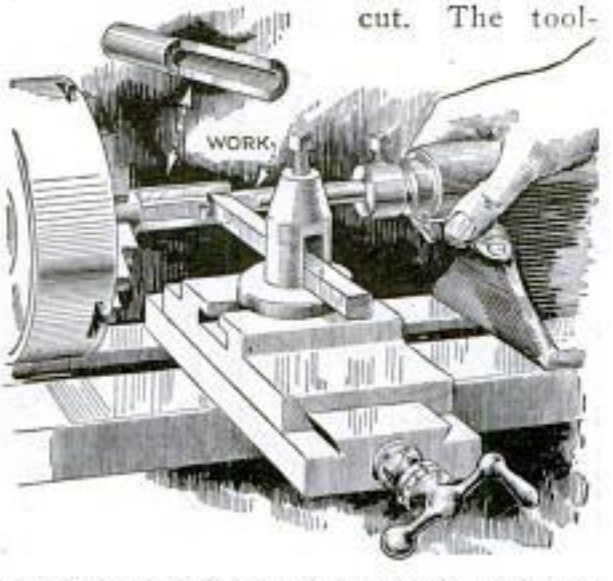
ton. A piece of small copper or brass tubing, long enough to reach to the bottom of the jar, is then soldered to a small tin box, which, in turn, is soldered to the underside of the cap, under the valve. These joints must be air-tight. Into the other hole in the cover is soldered a 10-in. length of tubing, bent at the end to form a spout.

Fill the jar with distilled water, and screw on the cap. It is now ready for use and can be kept handy on a shelf, and when the electrolyte is low, the spout is inserted in the filler holes of the battery and the water flow controlled by depressing the valve with the thumb.—Thos. W. Benson, Philadelphia, Pa.

Shaping in the Lathe

A short time ago I was confronted with the problem of planing a flat on some ¼-in. steel rods about 12 in. long. The drawing shows how it was done. A piece of ½-in. rod was obtained and a ¼-in. hole drilled through it lengthwise. It was then cut away, as shown in the detail, and mounted in the lathe chuck to serve as a guide for the work and to hold it against the pressure of the cutting tool. The ¼-in. rod to be planed was set in the tailstock so that it could be slid in and out of the hole in the ½-in. fixture by moving the tailstock along the lathe bed. The cutting tool was clamped in the toolpost, as indicated, so that it could be fed against the ¼-in. rod, and was advanced about .001 in. for each cut. The tool-post was, of course, tightened down securely so that it could not swing out of position.—R. B. Ware, Wadsworth, Ohio.



Easy Method of Cutting Flats on Steel Rod in the Lathe

Tire-Display Cart

For garages and tire concerns that have a small stock of tires, some of which are displayed in front of the store during the day, a cart of the kind shown in the drawing will be found useful. It can be wheeled in at night, and thus eliminates the work of carrying the tires in and out. The latter should, of course, be chained to the cart, as shown, to prevent theft. The cart consists of a frame made of channel or angle iron, 10 to 12 ft. long, about 3 ft. wide, and covered with 1-in. boards. The wheels may be bicycle or small auto wheels.—Waller Kaufmann, Santa Ana, California.

Convenient Cart for Holding Tires on Display in Front of Store

Simple Kink Saves Routing of Stereotypes

The kink described below will save much time in routing the "insides" of cuts in the stereotyping room. If, for instance, a mat of a house is to be cast, and the windows of the house are to contain reading matter, the usual method of doing the job would be to cast the mat in the machine and afterward to rout out the space in the windows and set in the reading matter. If, when casting, a piece of cardboard about the thickness of the cut being cast is placed on the mat in the space where the opening is to be, the cut will have the opening "cast" out of the metal. This eliminates the routing and saves a great deal of time.—Wilbert Whitfield, Fremont, Nebr.

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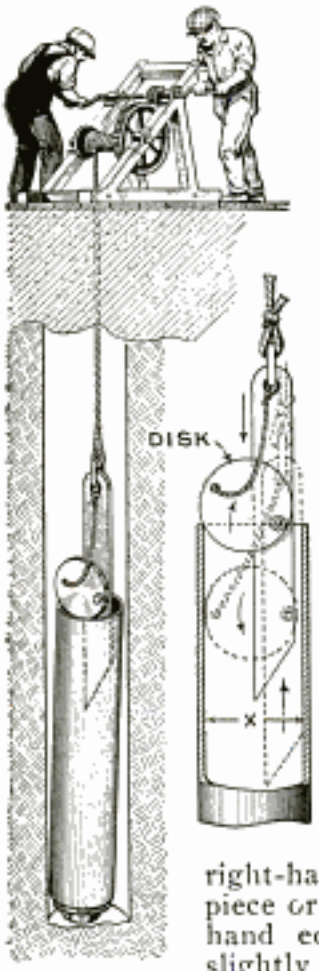
Removing Casing from Deep Well

Pump cylinders can easily be extracted from deep wells with the tool shown in the illustration. It is simply made and certain in action. The body may be any piece of flat iron, 18 to 24 in. long and 2 or 3 in. wide. A hole is drilled near one end for attaching the hoisting rope while the other end is cut to a point, as indicated, so that it will slide into the cylinder freely. A disk, about 1 in. less in diameter than the casing, and made from a pipe flange or any piece of iron of similar thickness, is arranged to swing eccentrically on the body on a bolt, and in such a manner that when the disk hangs in the horizontal position shown by the dotted lines in the detail, the distance between the right-hand edge of the flat piece or guide, and the left-hand edge of the disk is slightly (¼ in. is about right) greater than the inner diameter (X) of the casing. A hole is drilled in the disk diametrically opposite the pivot bolt and the edge on this side is notched in such a way that the teeth will not oppose the entrance of the tool into the cylinder. A piece of rope is tied to the disk and to the body of the fixture, as shown; this rope should be of such length that it will permit the disk to drop into the position shown by the dotted lines, but no farther. Here it will bind in the casing and when the hoisting begins, the teeth on the disk bite into the cylinder wall, holding the casing securely.—Chas. V. duToit, Middleburg, South Africa.



¶Before using a new hacksaw blade rub a small whetstone over any teeth that have too much set on each side of the blade. This will make the blade cut smoothly through metal, and there will be less risk of breaking some of the teeth.

Hand Stone Cleans Soiled Hands

My hands become extremely dirty handling hot linotype slugs, and although there are many kinds of hand soaps containing sand, pumice and other abrasive ingredients, I have found nothing that will cleanse as well as a simple hand stone, that can easily be made by anyone and will make the hands as white as those of an office worker. Mix equal parts of Portland cement and sand, about half a cupful of each, with sufficient water to make it the consistency of dough, and form it into a flat oval cake, pressing a groove in the middle of one side with the finger. It can be used as soon as it has dried thoroughly. Ordinary soap is rubbed on it and it is then used on the hands. This hand stone is not hard on the skin as the force of the rubbing is naturally controlled by the user. I have used such a cake for the last ten years and prefer it to any other kind of cleansing compound.—Geo. L. Michel, Jersey City, N. J.

Filling Radiators

A large taxicab company has found the device illustrated a saver of time in filling the radiators of its many cars each day. It is also useful in garages, filling stations and other places where quantities of water are required intermittently. The arrangement is simple enough; a water pipe with a lever-operated valve is run under the ceiling, as indicated. The valve handle is kept in the shut-off position by a spring hooked to the ceiling and water is turned on whenever needed by means of a cord or chain hanging down from the lever within easy reach of an attendant.

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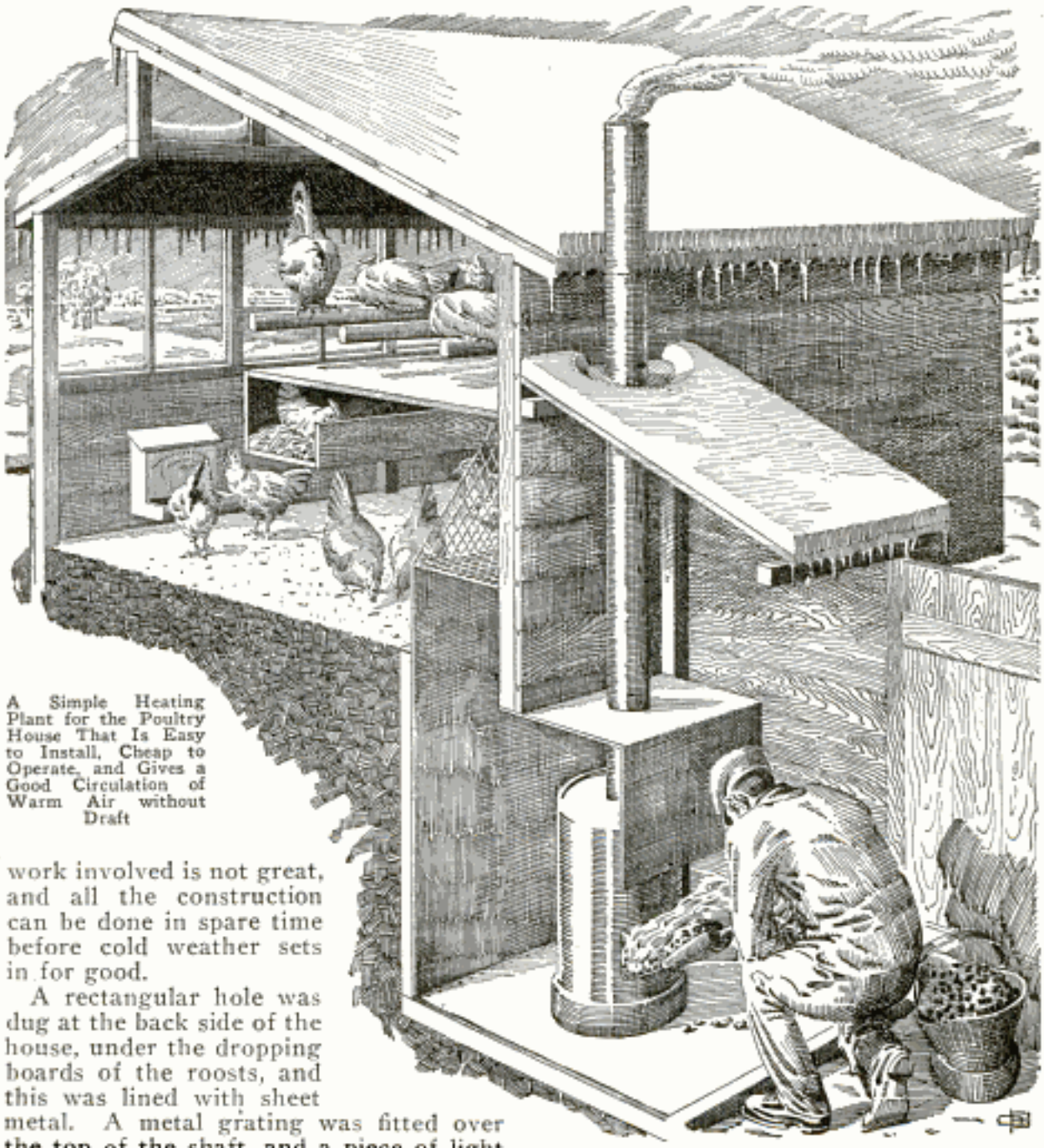
Heating the Poultry House

By EDW. R. SMITH

SUCCESSFULLY used to heat a poultry house that sheltered from 100 to 200 hens, the method shown in the illustration can be applied by almost any poultry raiser. On the farm where it was used there were no frozen combs last winter, and the egg production was considerably greater than it had ever been before during this season. A small fire in the morning and evening was all that was needed, and the results obtained were well worth the little attention required. The actual work involved is not great, and all the construction can be done in spare time before cold weather sets in for good.



A Simple Heating Plant for the Poultry House That Is Easy to Install, Cheap to Operate, and Gives a Good Circulation of Warm Air without Draft

A rectangular hole was dug at the back side of the house, under the dropping boards of the roosts, and this was lined with sheet metal. A metal grating was fitted over the top of the shaft, and a piece of light poultry mesh tacked at an angle over this, as shown, so that the birds could not roost on the top. An incline was then dug from the outside to meet the shaft, and a simple stove, made from an oil drum, placed in position. Three or four lengths of stovepipe carried the smoke from this to a point above the eaves of the house, the pipe being kept 5 or 6 in. from the side of the house. A sheet-metal apron nailed to the bottom of the house sill and carried over the stove and about halfway down in front of it forms a hot-air chamber. A lean-to with a door was then built around the furnace, the sides of the shed coming close to the sides of the

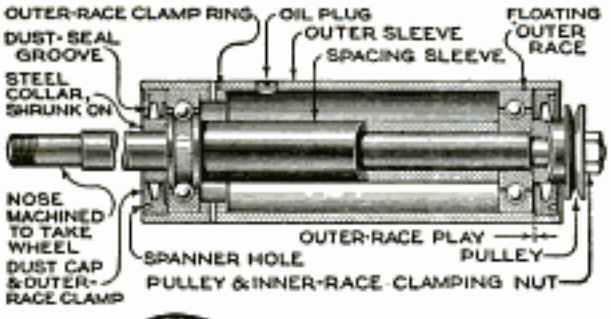
metal apron. As soon as the air around the stove becomes hot it rises up the shaft into the house.

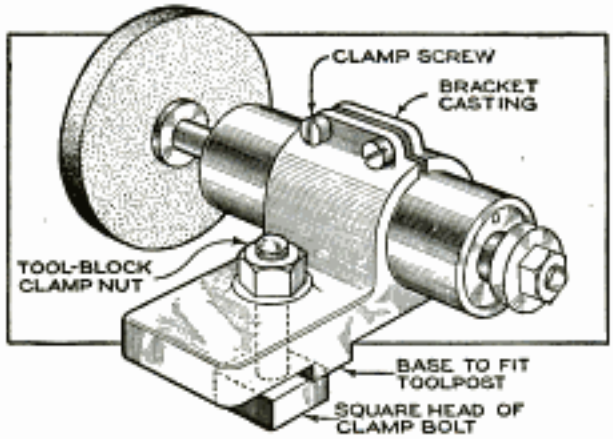
Coal or wood may be used in this type of heating plant, and the cost of installation and operation is small. It provides a current of fresh, warm air without draft, and the fire danger is small, as straw or other litter cannot be carried into the fire room by chickens or rats. In warm weather, the furnace may readily be cleaned, or removed if desired for any reason.

Ball-Bearing Lathe Tool-Block Grinder

An accurately built grinding-wheel head fitted to the lathe tool slide, and driven by an overhead belt or separate electric motor, is a valuable accessory, especially in the small shop not equipped with a regular grinding machine.

The main difficulty in building a grinder head of this type is in making and fitting the bearings. Consequently, standard ball bearings are used in the grinder shown in the drawing, most of which have the same diameter for the inner races and outer housings. The limits recommended





Ball-Bearing Grinding-Wheel Head That Fits Tool Slide of Small Lathe

for fitting the bearings can be obtained from the makers and should be strictly adhered to. In general, both races should be clamped to the shaft without end play, though, for a small shaft, it is sometimes permissible merely to press them on. The drawing, however, shows them clamped in place. Close attention must be paid to proper lubrication and means for dust exclusion, as the lack of either will soon ruin the bearings. The outer sleeve is closed by screw end caps, that will retain the vaseline or light mineral oil with which the sleeve should be kept filled. The caps fit close to the spindle collars and have annular grooves turned in them which, when filled with vaseline, will prevent dust and grit from entering. Heavy oil or graphite should never be used in ball bearings.

The spindle is either turned from solid stock, with the central portion larger and the inner races pressed on and clamped with threaded nuts, or, as shown here, with the diameter turned to fit the bore of the races, plus whatever pressing allowance is recommended by the maker of the bearings. The two bearings are separated by a steel sleeve; one is held between the sleeve and a steel collar, which is shrunk on. The collar is shrunk on by turning the collar from .001 to .0015 in. smaller than the spindle, heating it red-hot and slipping it into place. When cold, it will be "frozen" to the spindle and can be turned down smoothly all over. Then the inner race, the long sleeve, and the bearing are slipped on. The drive pulley, with a long hub, and the end nut will clamp all in place.

A length of heavy steel tube is best for the outer sleeve, although iron pipe can also be used. Both ends must be bored out a push fit for the bearing housings. Should a tube of the exact diameter be obtained, a clamp ring must be driven in one end for the fixed housing to seat against. None will be needed at the opposite end, as that housing will "float." In boring the ends of the sleeve, care must be taken to get both bores in line and concentric, otherwise the bearings will bind. One dust cap is recessed to provide clearance for the inner race; this one clamps the fixed housing in place. The other merely screws into the end of the tube and does not seat against the housing. They are bored out to clear the spindle sleeves by .0015 in. Disks sawed from a length of steel shafting can be used to make the caps, which are screwed into place with a spanner wrench.

A cast-iron bracket, bored out to a push fit for the sleeve, split, and fitted with two clamping screws, is the means provided for attaching the grinder head to the tool slide. The bracket should be made to hold the spindle in line with the lathe centers. If the lathe has a compound rest, the

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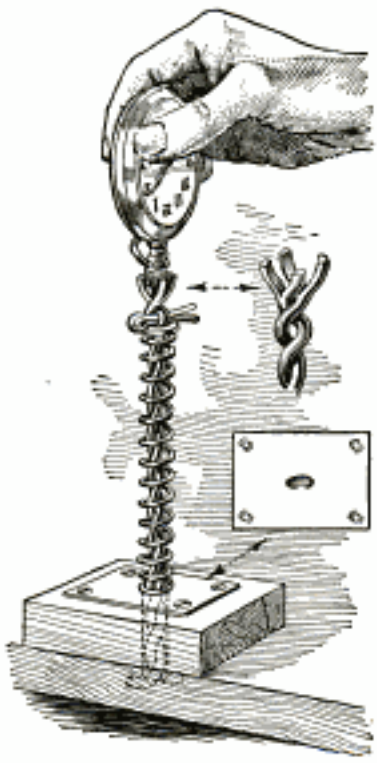
bracket lug has a boss cast on the bottom to fit snugly into the toolpost slot; then the grinder head can be swiveled accurately by means of the compound-rest graduations. A bolt with a large square head clamps the bracket to the tool rack.

The driving pulley may be either grooved for a round belt or straight-faced, with flanges, for a flat one. The spindle speed depends altogether upon the size of the grinding wheel used; this might be a very small one for internal grinding or a larger one for external cylindrical work. All rotating parts should be finish-turned all over, to insure running balance at high speed.

Watch Winder for Jewelers

Jewelers and watchmakers who have many watches to wind by hand will appreciate the device shown in the illustration. Two 8-in. lengths of wire are twisted together to form a helix or screw and inserted through a hole in the workbench as indicated. A steel plate, with an elongated hole punched or drilled through it to form a nut for the screw, is screwed on the bench top, and a stout coil spring is placed over the helix and held in place by a cotter key, which is passed through a twist near the end of the winder. The lower ends of the wires are bent over at right angles to prevent them from being pulled out and the upper ends are split with a hacksaw and spread apart to form four claws; by pressing downward against the tension of the coil spring, the spiral is caused to turn and wind the watch. Care should be taken, of course, to twist the wires forming the helix so that they will turn the stem in the proper direction.—G. E. Hendrickson, Argyle, Wisconsin.



Guard for Shears

When cutting sheet metal, the worker's right hand is in danger of being cut by the edges of the sheet passing under the shears. This danger can be overcome by brazing a piece of sheet metal to the lower handle, as shown in the drawing. The shears can then also be set on the bench in a position where they can be picked up conveniently.—W. A. Saul, Lexington, Mass.

Sheet-Metal Shield on Tin Snips Protects Hand from Injury

A Split Spacing Washer

On the driveshaft of my car there was an excessive amount of end play between the clutch and the transmission housing. Not caring to dismantle the parts in order to insert a spacing washer, I decided to insert a split washer. As the requirements called for a narrow collar which did not allow sufficient room for screwing the two halves together, I decided on the design shown in the drawing and found it perfectly satisfactory. A collar of the correct thickness was made and grooved all around. It was then cut in half and a piece of round spring wire, bent as shown, was placed in the groove so that the bent ends would snap into holes drilled in one part of the collar.—R. H. Kasper, Philadelphia, Pa.

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Turning Cement Sacks

Builders, contractors and construction men who use large quantities of cement usually take pains to save and return the empty sacks for credit. However, they will not be

Quick Method of Turning Cement Sacks Inside Out to Remove All of the Cement

accepted unless they are turned inside out to insure the removal of all the cement, as any cement left in them soon hardens on the sack, making it useless. To turn a few of the sacks inside out is not a very big task, but when several hundred have to be turned, the simple labor-saving device shown in the drawing will pay for itself in a very short time. An iron fork of ½-in. stock is welded to an 8-in. ring of the same material. This fixture is supported vertically by driving the point of the fork into a heavy wooden block, as shown in the drawing. To turn empty sacks inside out, the operator simply lowers the sack through the iron ring and then pulls it downward over the edge with both hands. In this manner, several hundred sacks can be turned in an hour.

Saving the Clippers

With either power or hand-operated hair clippers the barber must continually shake or rap them against the chair, in order to remove the hair from their teeth. While this may not involve much risk of damage to the clipper, it is annoying to customers. To avoid this, I attached a solid rubber ball by means of a countersunk screw to either side of the chair at the top, and found that, by tapping the clipper lightly against the ball, all the hair ends were thrown out.—Lewis Ambler, Manchester, Tenn.

Using Boiler Flues for Building

Needing additional space without delay and at a minimum cost, a boiler and tank concern made use of a large number of old iron pipes and boiler flues to make the framework of the new building. The pipes were readily cut to the correct lengths with an oxyacetylene torch and were then welded to each other at the joints. Each unit of the frame was assembled on the ground and then hoisted into place with a derrick. They were seated on a previously prepared foundation and later welded together to make the whole frame solid.

Large Funnel for Garages

Large funnels are of advantage in handling quantities of oils and other liquids in the shop but are not usually available. It is, however, a simple matter to make a funnel of large size that is as good as any manufactured article. To do this, a galvanized-iron pail of the desired size is obtained, and a hole is cut through the center of the bottom, a gasket being, of course, provided between the flange and the bottom. Small holes are drilled through both the bottom and the flange, and these are tapped to receive screws, which hold the flange and pipe securely to the pail. Lock washers are provided under the heads of the screws to prevent them from unscrewing. A cap is also fitted on the end of the pipe to permit carrying the pail around when filled.

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Prize Offers and Announcements

$50—Formula for Writing Ink

If it is possible to improve the quality of their Tar Black ink, the Hunt Pen Company, makers of Speedball lettering pens and inks, will pay the sum of $50 for such a formula, provided the ink meets the following requirements to the satisfaction of the company. It must be jet-black and must dry moderately quickly with a slight reddish tinge, as this is desirable for reproduction purposes. It must be waterproof, must flow freely and still be dense enough to cover opaque when thinned out in the larger-sized pens. If the formula can be made to include colored inks, it will be more desirable. Address C. Howard Hunt Pen Company, Camden, New Jersey. This offer expires May 1, 1925.

$500—Bait for Rat Poison

We have perfected and patented a new chemical composition based on cyanide, the smallest particle of which in a rat's stomach will cause the animal's instant death. By the use of this poison rats die within a foot or two of where they eat it. We desire to market this poison already prepared, so that the user has simply to spread the poisoned bait in infested areas. The bait should be a neutral one, that is, neither acid nor alkaline, and of such a nature that it can be manufactured in small particles about the size of a grain of wheat, so the rat will be tempted to eat them where he finds them instead of carrying them away. What is required is a bait, filler, or carrier which will have either an odor or food appeal sufficient to impel rats to eat it, even in the presence of other food. It should be a bait or food which rats will prefer to any other that would ordinarily be available. For a satisfactory formula, or bait combination for the poison that passes our tests, this concern will pay the sum of $500 in cash. This offer is good for one year from November 1, 1924. Address American Chemical Works, 720 Washington Avenue, Minneapolis, Minnesota.

$300—Hand-Printing Press

The sum of $300 in cash and royalties will be paid for a satisfactory design and drawings of a simple self-inking hand-operated printing press by this donor. The press should be six by nine inches in size and one which can be manufactured from cast iron at a cost not exceeding $25. All designs submitted must of course meet the requirements of the donor before being considered for adoption. Address all matter to C. L. Whitfield, 429 East Bute Street, Norfolk, Virginia. May 1, 1925, is the closing date for this offer.

$25—New Uses for Cel-o-Glass

The sum of $25 will be paid by Cello Products Incorporated for each suggested new use for its product, Cel-o-Glass, provided said use is of such character as to open up an entirely new and definitely accessible market for the sale of this adaptable material. Entries will be judged by the company alone. In case of duplication of suggestions, preference will be given to the one first received. List of present uses and other information can be had from the donor. Address all replies to Cello Products Incorporated, Box 28, 89 Fulton Street, New York, N. Y.

OFFERS ANNOUNCED IN PREVIOUS ISSUES

All of These Offers Expire May 1, 1925

FOR THE BEST SUGGESTED IMPROVEMENT on a gasoline-heated blowtorch and soldering and branding iron combined an award of $500 will be paid by the Everhot Manufacturing Company.

AWARDS OF $500 EACH WILL BE PAID for a waterproofing process for a library paste and a method that will produce increased sales of this product. John J. Harris and Company,

$2,000 WILL BE PAID BY THE NORTH Shore Food Products Company for a method of processing or preserving cottage cheese to keep it fresh for at least two weeks.

THE CARR FASTENER COMPANY WILL pay $500 for a reservoir grease cup which can be filled with a grease gun and feed out the grease at a slow rate.

FOR NEW WAYS OF USING BUTTON molds $500 will be paid by donor in Problem HA-1, and the same concern will pay $500 for new uses for button-mold machines as stated in Problem HA-2.

A SLOGAN AND SALES PLAN IS WANTED by the Casmine Company for a medicinal ointment. They will pay the sum of $250 for those accepted.

DISCOVERY OF NEW USES FOR CARBON-dioxide gas or improvements to present uses. Award $1,000.

FOR A SIMPLE DESIGN OF A 2-KW. MOTOR generator set, or rotary converter and one which this concern will accept, the William H. Mitchell Company will pay $500.

THE GEMCO MANUFACTURING COMPANY will pay $250 for suitable article they can make in their general metal-working plant.

DONOR IN PROBLEM PD-1 DESIRES A DESIGN for a starting switch for an alternating-current motor and will pay $100 for the one accepted.

TO THE PERSON SUBMITTING TO THEM an article which they can make in their machine and electrical shop, the Guyan Machine Shops will pay $250 over and above its royalties or sales price.

GRANITE STATE MOWING MACHINE COMpany offers $500 in cash and royalties for satisfactory working drawings for gasoline-motor lawn mower they accept for manufacture and marketing.

NATIONAL BRASS COMPANY WILL PAY $300 for design of key guide that can be made of sheet metal and which will properly fit escutcheon plate of similar material.

TO ANYONE WHO WILL PRODUCE FOR them a saxophone reed to satisfactorily replace the present reed, the Buescher Band Instrument Company will pay the sum of $1,000.

THE PHENIX RADIO CORPORATION WILL pay the sum of $1,000 for the design of a new form of condenser for radio reception.

FOR A SATISFACTORY HAMMER-BLOW arrangement for a portable hammer drill, the Wodack Electric Tool Corporation will pay the sum of $500.

$2,000 WILL BE PAID IN SEVERAL AWARDS for processes and machines for salvaging waste lumber. National Lumber Manufacturers' Association.

FOR SKYROCKET STICK HARMLESS IN descent, $1,000; bombshell with illuminated flag, $250; chemical combinations to produce smokeless fireworks colors, $250. Thearle-Duffield Fireworks Company.

MOTOR-OPERATED HANDSAW FOR MANUfacture and sales; award, $10,000 in royalties. R. L. Barker and Company.

ELECTRIC HEATING ELEMENT WHICH will operate and interchange with base and cover of Imperial self-heating gasoline iron, $500. Imperial Brass Company.

FOR A NEW METHOD WHEREBY SCRAP leather in a glove factory can be profitably disposed of, Eisendrath Glove Company will pay the sum of $5,000.

NATIONAL SLATE ASSOCIATION WILL pay $200 for best suggested new use for slate; other accepted suggestions paid for in proportion to value.

WILLIAM H. MITCHELL COMPANY WILL pay $500 for three new uses suggested for low-voltage generators which they adopt as part of sales plan.

THE BENJAMIN ELECTRIC MFG. COMPANY will pay $250 for fitting stand lamp clusters to old vases; $150 for most practical method of using electric shop materials for lamp stands and $100 for business boosting scheme.

THE SUM OF $50 IS OFFERED BY THE Parsons Manufacturing Company for the best plan they receive for uses of ground slate.

FOR ACCEPTED IDEAS FOR NEW USES OF fans, blowers, shutters, and unit heaters Ilg Electric Ventilating Company offers $5,000 in various awards.

$500 FOR SALES PROMOTION PLAN FOR absorbent, non-heat-conducting powder that can be used with other materials. The Keasby and Mattison Company.

Full Details Regarding the Previous Offers Listed Above, May Be Obtained by Addressing the Bureau of Information, Popular Mechanics Magazine

FROM THE EDITOR'S MAIL BAG

I have made a number of things that have appeared in Popular Mechanics and here are some of them I made last year: Twin Oscillating Engine; Experimental Pressure Pump; Collapsible Stool; small jack; waltzing wagon; musical toy and cycling monkey.

Needless to say these articles have given me every satisfaction. Six months ago I received the 15 Vols. of Shop Notes from you. I must say they are the finest investment I ever made. I have paid some high prices for engineering books here, but the information I have received in these books is negligible to what I have received in your valuable magazine and Shop Notes. My wife tells me that if I gave as much attention to her as I do your books, I would be an ideal husband. I will close now, thanking you for the knowledge I have received from your hands.—Sydney Johnson, Wigan, Lancashire, England.

* * *

As you may see for this letter I do not know very well the English language, but I can read it, and with the aid of two dictionaries I have understood, more or less, every thing in your magazine.

Therefore, I have made some little things described or suggested in your books. The first and principal is the detector and two-step amplifier for dry cells. I have made also a lamp to indicate blown fuses; preventing bell contacts from sparking; moving-picture toy for children; time exposure with hand camera, etc., but the principal is the above-mentioned. Now I will try building the neutrodyne receiver. Again, I have solenoids. Your California cooler suggested to me an especial cupboard for my wife. She has made too some beautiful lamp shades, and now she is making artificial flowers to sell them, all from your magazine.

I have not made more because I have not a shop, but all your descriptions are so easy and intelligible (written so we can understand it) that we have not many troubles to do anything. In my opinion your magazine is better, or like, a short school.

Receive my congratulations and be sure that your efforts are not in vain, and that your books regress (excuse me this Spanish word) more than our twenty-five cents.—Raymundo Hernandez, Mexico City, Mex.

* * *

I have taken Popular Mechanics Magazine for past 10 years, have made many useful things, restored a number of different things, but if I was to mention every one would take a sheet of paper as large as some newspapers. One thing, taking a screen-door spring for auto emergency fan belt in February 1923, I did that instead of joining with wire. I made a book and eye and joined together. That has been on my Packard truck for most a year. Another, in June 1923, detector and two-step amplifier radio receiver for dry cells. I wrote your Mr. Brittin about two or three changes and to which I received almost an instant reply. Again in January 1924 number, illuminating the Christmas wreath, my boy and I made two, put them in the windows. They attracted some attention from passers-by. Again in February 1924 number, I have started to build the five-tube neutrodyne receiver. I get my magazine from my news dealer. I would not be without it, the best in its class, written so you can understand it, truly said. I thank you for all of above helps and what are to come. I keep all magazines; sometime in the future I may have them bound for ready reference.—B. C. Miller, Newark, N. J.

* * *

In this month's issue of Popular Mechanics, page 307, Mr. Lorin A. Brown, Washington, D. C., informs us how he has made a serviceable snow scraper. Well! Writer believes he has gone Mr. Brown one better by using an ordinary wooden teeth garden rake just as it is made (no alterations whatever). I have used same for pulling down snow banks during the last three winters, and say, gentlemen, it works like a charm. Snow can pass between the "teeth" so that a person does not have to try to move all the snow that comes in front of the solid piece style. What is left on sidewalk can be swept off, anyway, a wooden solid piece scraper cannot clean better in my estimation.—Harry W. Kneemoeller, Jr., West Philadelphia, Pa.

* * *

Regarding articles in your magazine, I shortened valve stems without removing the cylinder head, by doing as you suggested with a file, grinding the lower side of the file smooth and drawing it back and forth under the stem until I had the proper clearance. I also used another suggestion. I laid sheets of iron on my furnace and found it helps to save fuel. "How to Start a Cold Motor" is another hint that I have tried more than once.—W. J. B., Milwaukee, Wis.

* * *

Your articles on "Twenty Years Ago in Popular Mechanics" remind me that I used to cut all the articles in your magazine pertaining to automobiles. I used to vision that it might be possible that some day I would either be working for a man that owned one, or that I might be able to fix up a second-hand machine. How times do change! Since then I have owned several machines, and I now have visions of owning an aeroplane.—Stanley B. Moore, Cleveland, Ohio.

* * *

I read the whole magazine with much interest, but have derived the most benefit from the hints and ideas for executing mechanical work when unable to secure the proper tools. I have many others in mind which I intend to use some day, any one of which may easily mean a saving of more than a year's subscription to Popular Mechanics.—Engineer-in-Charge, Govt. Printing Office, Melbourne, Australia.

* * *

In the June issue of your magazine, Page 952, is an article on figuring water for house and farm, etc. In this article you state that 10 gal. of water is to be figured as the daily allowance for a cow; I would like to correct this statement. A dry cow on pasture in cool weather will drink considerably more than 10 gal. a day—two or three times as much, in fact. Many cows, milking heavily, will drink 40 gal. or more daily in warm weather, and maybe with a dryish feed.—George Pope, Delhi, Calif.

Our Radio Department exists for your service, and the Editor will gladly help you in selecting or building the best set for your purpose, assist in locating trouble in your present set, furnish you a circuit or tell you where to obtain parts for your new one, or aid you in any other way you desire.

Address all inquiries to the Radio Editor, Popular Mechanics Bldg., 200 E. Ontario St., Chicago.

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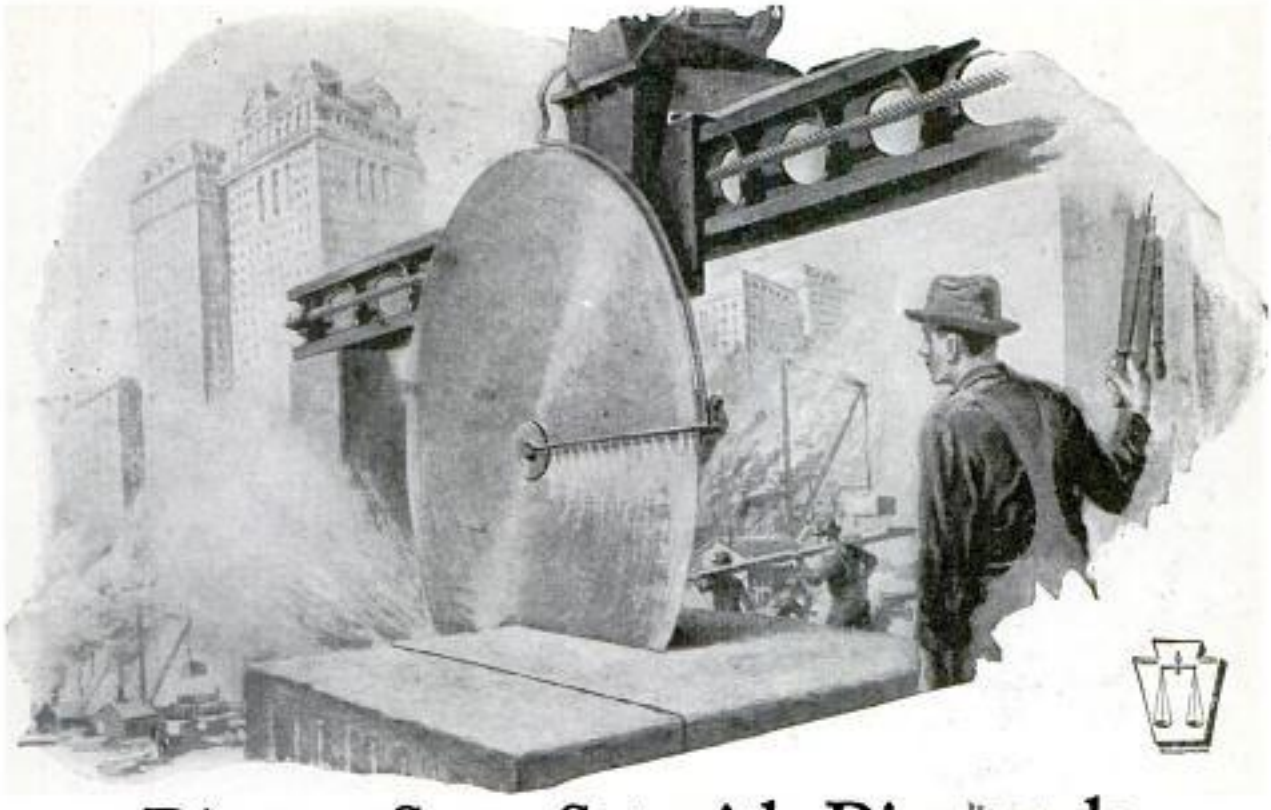

Disston Saws Set with Diamonds

cut the stone for your skyscrapers

Some Disston Saws that help you do better work:

Disston Hack Saws cut fast and stay sharp. The steel—developed by Disston steel makers—is harder and tougher. Blades are heat-treated by Disston experts. Milled teeth are shaped and set the special Disston way.

Disston Back Saw No. 4. A carefully made saw for extremely accurate cutting of mitres, fine joints, or stock of small dimensions.

Disston Coping Saw No. 10. A saw for cutting curved lines—scroll work, wood toys, ornamental wood work, etc. A strong saw with an adjustable tension, made to the Disston standard.

SINCE the time of the Pyramids, building stone had been cut by hand.

But America could not wait on the stone cutter with his mallet and chisel.

So the quarries and the builders turned to Disston for help.

And Disston, maker of "The Saw Most Carpenters Use," made circular saws that cut stone.

Saws, for example, 98 inches in diameter, with 180 teeth inserted in a blade of Disston Steel and six cutting diamonds set in every tooth.

But the saw set with diamonds is only an incident in Disston Saw history, while the Disston Hand Saw is a world achievement.

Before Henry Disston began making saws, in 1840, getting a good hand saw was pure luck. But users came to know that the name Disston on a saw blade meant a good saw every time.

For Henry Disston made it his business to know steel, from ore to crucible ingot. He found out how to roll, harden, and temper saw steel to give it life and spring, to make it hold its cutting edge.

Disston trained men to make saws such as never were made before. And these men loved their work, took pride in the Disston standard, taught their sons how to meet it.

It takes years to make a Disston saw-maker; and the skill of three generations of saw makers is back of your Disston Hand Saw.

You want a good hand saw—a saw that cuts true to the line, cuts fast without binding, makes your work easy. You want "The Saw Most Carpenters Use."

Go to the hardware store.

Take a Disston Saw in your hand.

Feel its hang, its balance, the way it responds to your touch and your will. No other saw works with you like that!

Note the spring and life in a Disston blade.

See the taper—thin on the back, thinnest at the further end—to give clearance to the blade and make the saw run easy.

On the blade, over the Disston signature, read the words that every carpenter knows by heart:

"For Beauty, Finish and Utility, this Saw cannot be Excelled."

Then, and every day when you use your Disston Saw, you will know what mechanics, the world over, have learned—that the way to judge a good saw is to look for the name Disston.

—

Ask Disston

Tell us what kind of work you are doing, in wood metal, stone, or other material, and we will tell you what types of saws to use. Disston issues many books to aid the user of saws and tools.

HENRY DISSTON & SONS, INC.
Philadelphia, U. S. A.

Hardware dealers the world around sell Disston Saws, Tools, and Files

DISSTON

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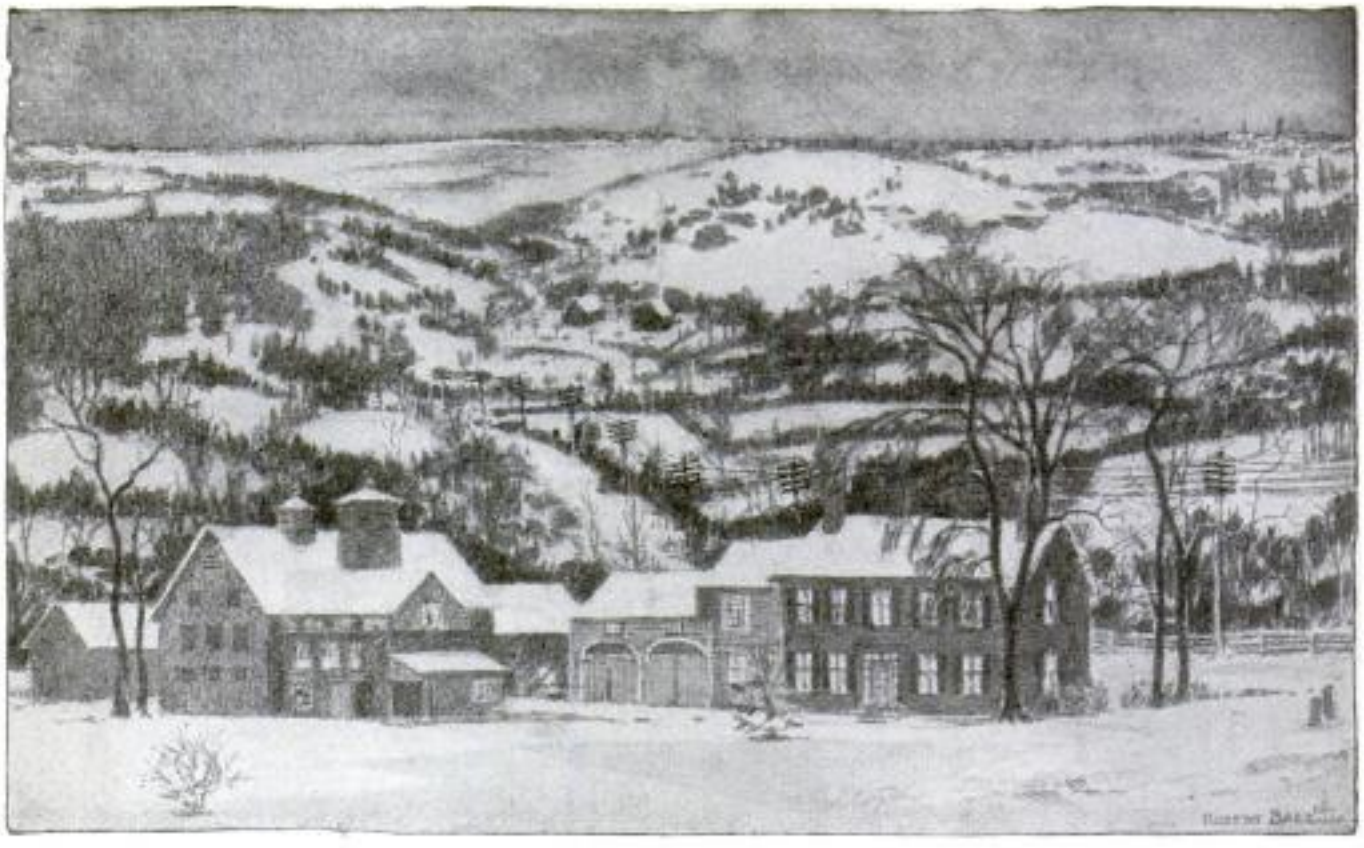

NEIGHBORS

When Ephraim Crosby made a clearing far out on Valley Road and built his house, he had no neighbors. He lived an independent life, producing on the farm practically all that his family ate and wore. Emergencies—sickness and fire and protection of his homestead from prowlers—he met for himself. Later he had neighbors, one five and another eight miles away. Sometimes he helped them with their planting and harvesting, and they helped him in turn. Produce was marketed in the town, twenty miles along the cart-road.

Today Ephraim Crosby's grandchildren still live in the homestead, farming its many acres. The next house is a good mile away. But the Crosbys of today are not isolated. They neighbor with a nation. They buy and sell in the far city as well as in the county-seat. They have at their call the assistance and services of men in Chicago or New York, as well as men on the next farm.

Stretching from the Crosbys' farm living-room are telephone wires that lead to every part of the nation. Though they live in the distant countryside, the Crosbys enjoy the benefits of national telephone service as wholly as does the city dweller. The plan and organization of the Bell System has extended the facilities of the telephone to all types of people. By producing a telephone service superior to any in the world at a cost within the reach of all to pay, the Bell System has made America a nation of neighbors.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

AND ASSOCIATED COMPANIES

BELL SYSTEM

One Policy, One System, Universal Service

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"I make it easy for my men to turn out good work"

Said a repair shop owner

"Take the matter of drilling for example. Hand feeding is often responsible for inaccurate work, lost time, and broken drills.

"My men use a 'Yankee' Chain Drill which eliminates hand feeding. They just turn the brace and the 'Yankee' Automatic Friction and Ratchet Feed does the job.

"The Friction Feed runs drill down to work, then the Ratchet Feed guides drill through cut with the right pressure.

"Jobs take less time. I save money for my customers and make more myself. And the annoyance of broken drill points is almost entirely done away with."

Write us today for the "Yankee" Tool Book which interestingly pictures and explains "Yankee" Tools. Mailed FREE.

Some other "Yankee" Tools

Spiral Screw-drivers
Quick Return Spiral Screw-drivers
Ratchet Screw-drivers
Plain Screw-drivers 1¼ to 30 inch blades
Ratchet Hand Drills
Ratchet Chain Drills
Ratchet Bench Drills
Automatic Push Drills
Ratchet Tap Wrenches
Bench Vises, Removable Base

Look for the name "Yankee" on every tool you buy

"YANKEE" Chain Drill

is a tool that will be in constant use in your shop from the moment you get it. Like all "Yankee" Tools it makes mechanics more efficient and profitable.

No. 1500 (Illustrated) 3-Jaw Chuck holds round shank drills up to ½ in.

No. 500 2-Jaw Chuck holds square shank drills up to ½ in.

For lighter drilling "Yankee" Ratchet Breast Drills and Ratchet Hand Drills are indispensable to modern well-equipped repair shops.

Dealers everywhere sell "YANKEE" Tools

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

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Make Big Money Selling Radio Instruments

Let Me Show You How I have Enabled More Than 2000 Men to Start a Good Paying Business of Their Own

Four-Tube Sets As Low as

$39.50

J. MATHESON BELL
President

JUST as sure as you can show me that you are the right kind of a man—that you have ambition and spunk and are determined to better your position and condition in life—just that sure am I that I can show you a plan whereby you can make a success in this new field and reach your goal.

Radio has grown from nothing within three years to be one of the greatest industries in this country. I am satisfied I can show you a plan whereby you can make big money in territory not already covered, as I have with thousands of others.

The Ozarka Plan is the first and only one of its kind which enables the average man to start a manufacturing business of his own and pay no one any unnecessary profit. It will give the right kind of a man an opportunity to get on his feet even in his spare time, and establish himself in a permanent and profitable business of his own.

The man I am looking for is having a hard time making ends meet. He is willing to learn—willing to try and try hard, if he can only be shown and given a helping hand to get started.

The man I am looking for is not a "floater." He has a good position and he has held that position for some time. He is well and favorably known in his community—he is honest, hard working and industrious. He may not have much money—he is not completely broke and looking for a job. Generally he has a family and wants to do the best he can possibly do for that family.

During the past three years I have shown over two thousand men how to get "out of the rut"—how to pull themselves up and get on their feet. I am satisfied I can do this for you, or any other man, if you are willing to do your part. The public is buying radio instruments more and more every day, and yet in this wonderful business there is a field wide open for you.

Our entire plan of selling is described in a large illustrated book "The Ozarka Plan." This book is free for the asking and, for any man who is determined to improve his condition, it will no doubt be just what he is looking for. It has been the turning point in the lives of a great many men—it will mean the same to you. At any rate, you will enjoy reading it, because it is a story of men, a story of their successes and failures. It proves why some men fail while others succeed. It shows clearly why a few men in this country are the employers of mobs of men who are toiling daily to make millionaires out of a few.

Thousands of men have written me and stated that this book is the most wonderful story they have ever read. After all, it is the story of myself and the Ozarka organization, who have started from absolutely nothing in this world and pounded our way to success. I know that this book will be a revelation to you, and yet it is only a question of writing me a letter and telling me about yourself—tell me what you have done—tell me what you are now doing—and ask for Book No. 100.

In doing so, however, don't fail to give the name of your county.

The Ozarka Plan has been a very expensive book for us to publish, but nevertheless we will gladly send it to any man who feels that there is still an opportunity left for him to get what he wants.

OZARKA, Inc., 851 Washington Blvd., CHICAGO, ILLINOIS

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Heating experts discover how to make cold radiators HOT

Steam and Water cannot pass

But the moment that steam fills the radiator and enters the valve chamber, this wonderful little float expands from the heat and closes up the outlet by thrusting a pin up into the vent-hole, holding it tight shut as long as steam is present. Water, very likely to be present in steam pipes, lifts the float up until the vent is closed by the pin. With AIRID on guard, there is no chance for the radiator to spout like a geyser. An ingenious syphon pipe returns all water to the radiator.

Clever contrivance costs $1.60— can be installed by anyone

A REMARKABLE mechanical device is now being made to get full heat from steam radiators. The secret of it lies in its ability to distinguish between air and steam, or air and water, and to keep the radiator constantly free from air without permitting the escape of the other two elements. Hence the name AIRID, because it *rids* the radiator of cold air.

The Institute of Thermal Research in Buffalo, N.Y., worked for many years to perfect AIRID. They knew that it must not hiss with escaping steam, nor drip water. They knew that it had to be absolutely automatic and permanently adjusted so that no one could tamper with it.

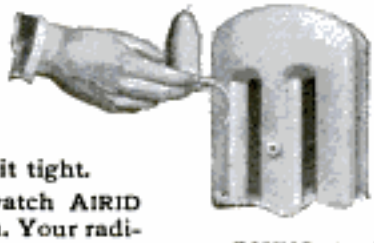
Rids radiator of cold air

Steam, on coming into a radiator, pushes air ahead of it. Unless this air can escape, it forms a barrier beyond which the steam cannot penetrate. Thus it is possible for as much as half the radiator to be literally "choked" with cold air. No wonder steam radiators, equipped with old style air valves, won't get hot!

AIRID rids the radiator of this cold air. Inside of AIRID'S nickel-plated case, is a little float which may be said to contain the brains. Cold air, propelled by the steam, passes around this float and out through a vent-hole in the top of the valve.

SEND COUPON—*attach* AIRID *yourself*

Anyone can make a cold radiator hot by using the coupon below. AIRID can be installed by hand in two minutes without tools. Just unscrew the old valve, after turning off the steam, and insert AIRID into the same hole, screwing it tight.



Then turn on the steam, and watch AIRID work. The difference will surprise you. Your radiator becomes hot almost immediately. And the total cost is only $1.60.

Year after year, AIRID will go on making your radiator hot. It saves the cost of extra fuel that you might otherwise burn in trying to force the fire for more steam pressure. It saves bills for re-decorating made necessary by escaping steam and dripping water. It saves the wear and tear on nerves, caused by hissing and sputtering.

Made and guaranteed by

AMERICAN RADIATOR COMPANY

Sold at all heating and plumbing shops

AIRID

AIR-VALVES

Send this coupon with $1.60— TODAY

AMERICAN RADIATOR COMPANY
Specialties Dept.
1807 Elmwood Ave.
Buffalo, N.Y.

I am enclosing $1.60 for an AIRID Air Valve to make my coldest radiator *hot*.

Name.....

Address.....

.....

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The best and most complete saw equipment on the market — Complete Outfit as shown, including cord, plug, belt and pulley.

$35

For Handy Man and Mechanic

With this saw you can make your own repairs in shop, home, farm or garage. Makes a clean edge on the toughest wood—no planing necessary. Rips, crosscuts, bevels, miters, mortises, tenons, or grooves.

MECHANICS' BENCH SAWS

Attach to any lamp socket. Weight only 61 lbs. Will cut up to 1¼". All metal. Saw-size 6 in. Table 10x13, base 7x11, height 7 in. Table tilts for beveling 5 degrees left, 10 degrees right. Hinged top for cutting grooves, tenons, rabbets. Bearings solid bronze with grease cup lubrication. Guides removable and adjustable rip and cut-off. Sunlight ¼ h. p. motor; 110 volts; 60 cycle; 4.5 amps; 1750 R. P. M. Current A. C. Centrifugal switch with auxiliary finger. High grade steel shaft with ground bearing surface. Water and moisture proof insulating material used throughout. Exterior connections to allow change of direction of rotation. Large grease cups with wick lubrication. Bearings of Bunting phosphor bronze metal.

SAW TABLE can be purchased with 6" saw for **$22.50**; We Pay Delivery Charges Anywhere in the U. S..... **$22.50**

MOTOR This heavy duty Motor can be furnished separately for **$15.90**; Complete with Cord, Plug, and flat or grooved Pulley. Guaranteed 50% Overload. We Pay Delivery Charges Anywhere in the U. S..... **$15.90**

$35. $60 VALUE

East of the Mississippi. We Pay Delivery Charges. $38 west of the Mississippi. We Pay Delivery Charges.

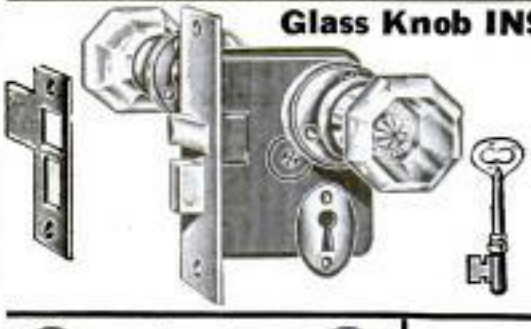
Complete Outfit

Including cord, plug, pulley and belt, everything complete, ready to attach. Disston 6" Novelty Combination Cross Cut and Rip Saw, guaranteed to run without set. Extra heavy duty motor guaranteed to handle 50% overload.

BUILDERS' HARDWARE AT ½ PRICE!

Send us your list for quotation—or mail us your plans. We will return them same day as received.

SEND FOR OUR NET PRICE BUILDERS' HARDWARE CATALOG



Glass Knob INSIDE LOCK Set

1 Lock, Japan case, 3½x3½x9/16 steel plated face.

1 pr. Glass knobs with solid brass roses.

2 Solid brass escutcheons (key plate).

Parcel Post charges 15c **$1.39 PER SET**

Per dozen sets $15.95

GLASS DOOR KNOBS Solid Brass Roses

A price never heard of before for a high quality glass knob. P. P. charges 10c. Per dozen pairs, $11.00

98c Pair

CLOSET LATCH SET With Glass Knob

1 Mortise latch, reversible; 1 Glass knob with brass rose; 1 Inside thumb turn, steel with steel rose. P. P. charges 10c. Per dozen sets $11.00

98c Per Set

SUNLIGHT 1/4 H.P. Motor

$12.90 Complete with Cord, Plug and flat or grooved Pulley

Regular Value $30 We Pay Delivery Charges Anywhere in U. S.

110 volts; 60 cycle; 4.5 amps; 1750 R. P. M. Current A. C. Guaranteed to handle 20% overload.

SEND FOR OUR CATALOG

PAUL J. DEVITT, 1101-1107 So. 2nd St., Phila., Pa.

HARDWARE HEADQUARTERS OF PHILADELPHIA

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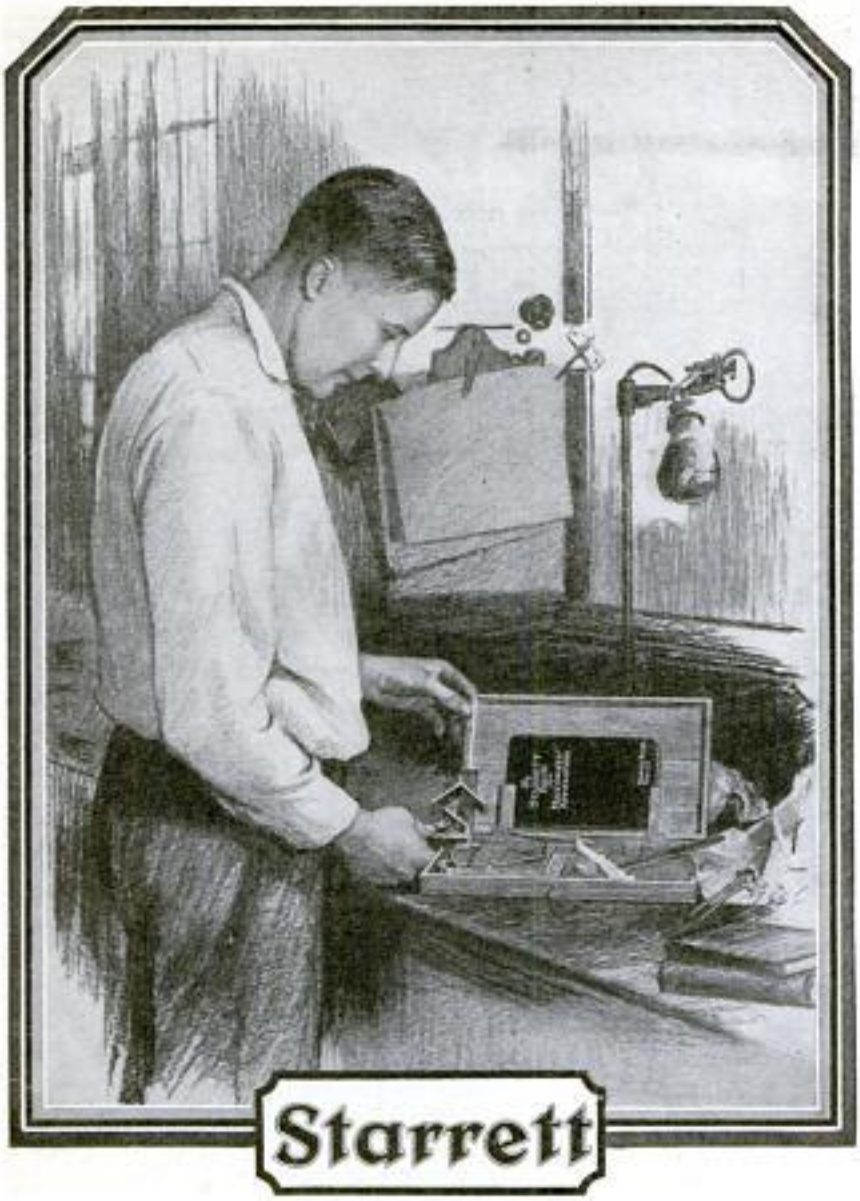


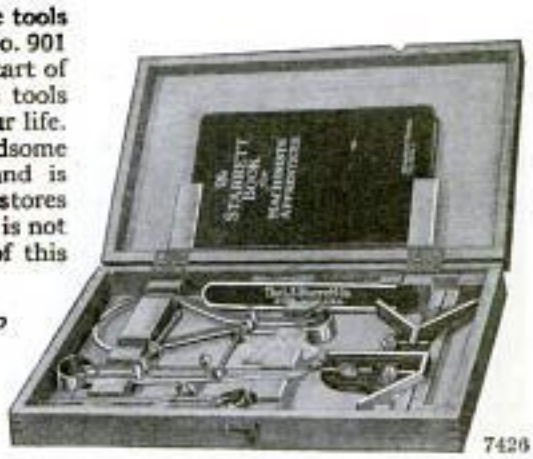
Are The Best Tools Too Good For The Beginner

Apprentice Set No. 901

When you learned to ride a bike you begged or borrowed from one of the kids an old wheel to practice on. That is, you did if you were wise.

But you can't learn a trade that way. You must have *accurate* tools to do accurate work and any mechanic will tell you so. That's why crack machinists advise the youngster to start with his own kit of Starrett Tools—the same fine tools they use themselves. In the No. 901 Apprentice Set you get the start of a kit of well-made, accurate tools that you'll use the rest of your life. The Set is contained in a handsome nicely finished wood case and is sold by good hardware stores everywhere. *At* a price which is not the least attractive feature of this splendid kit.

Write for Starrett Catalog No. 23 "AP" describing the uses of 2200 Fine Precision Tools. Free.



7426

THE L. S. STARRETT CO.

World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
ATHOL, MASS.

Set No. 901 consists of: No. 11, 6-inch Combination Square complete with Sliding Head and Center Head; No. 117 B, Center Punch. No. 320, 6-inch Flexible Steel Rule in Pocket Case; No. 390, Center Gage; No. 79, 6-inch Outside Caliper with Solid Nut, No. 73, 6-inch Inside Caliper with Solid Nut; No. 77, 5-inch Divider with Spring Nut, and the Starrett Book for Machinists' Apprentices, Vol. I.

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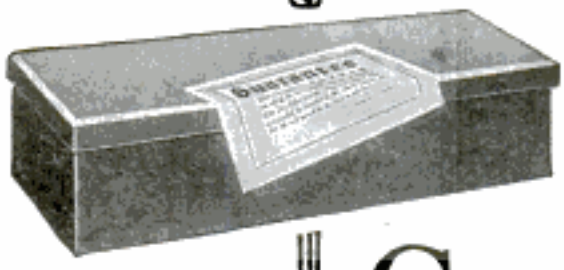

CIR-KIT makes the Greatest Circuits Easiest to Own

In a motor car—the engine. In a skyscraper—the substructure. In a radio receiver—the circuit. The circuit, Erla knew, must be the foundation of finest possible radio. So Erla first evolved those particular circuits which have ever since been rated most powerful, tube for tube, a result inherent only in Erla principles. And today the trend in radio clearly indicates that Erla Supereflex circuits may be selected in full confidence of continued pre-eminence.

That these fundamentally superior circuits are at the same time also easiest to construct, with utmost economy, is another epochal Erla attainment, made possible by the Erla *CIR-KIT*. With *CIR-KIT* you yourself can construct Erla Supereflex circuits from genuine Erla Precision Radio Apparatus, specially designed to assure the most efficient functioning of Erla Supereflex principles.

Erla *CIR-KIT* supplies everything needed, in a factory-sealed carton, sold under warranty. Erla Synchronizing Transformers, Erla Miniloss Condensers, Erla Precision Rheostats, Erla Cushion Spring Sockets, Erla Tested Crystals, and all the other matchless Erla units are provided. You can assemble them with perfect results virtually guaranteed by full-sized blueprints, drilled and lettered panel, stenciled baseboard, precisely locating every unit and connection. There is no soldering, thanks to Erla Solderless Connectors. Pliers and screwdriver alone are needed to bring you the de luxe radio of Erla Supereflex circuits, at lowest possible cost.

ELECTRICAL RESEARCH LABORATORIES
Department J, 2500 Cottage Grove Avenue, CHICAGO

ERLA

Secondary output windings of high impedance make Erla Push-Pull Transformers, exclusive in design, best suited to high resistance loud speakers. $10 per pair.

Only the special spring arm, the perfected bearing and winding of Erla Precision Rheostats permit such supersensitiveness. Single-hole mounting preserves factory adjustment. $1.10.

Neatest, most convenient in form, Erla Autogrip 2-Way Phone Plugs assure smoothest connection of tips and most positive contact, with no manipulation. A typical Erla improvement. 75c.

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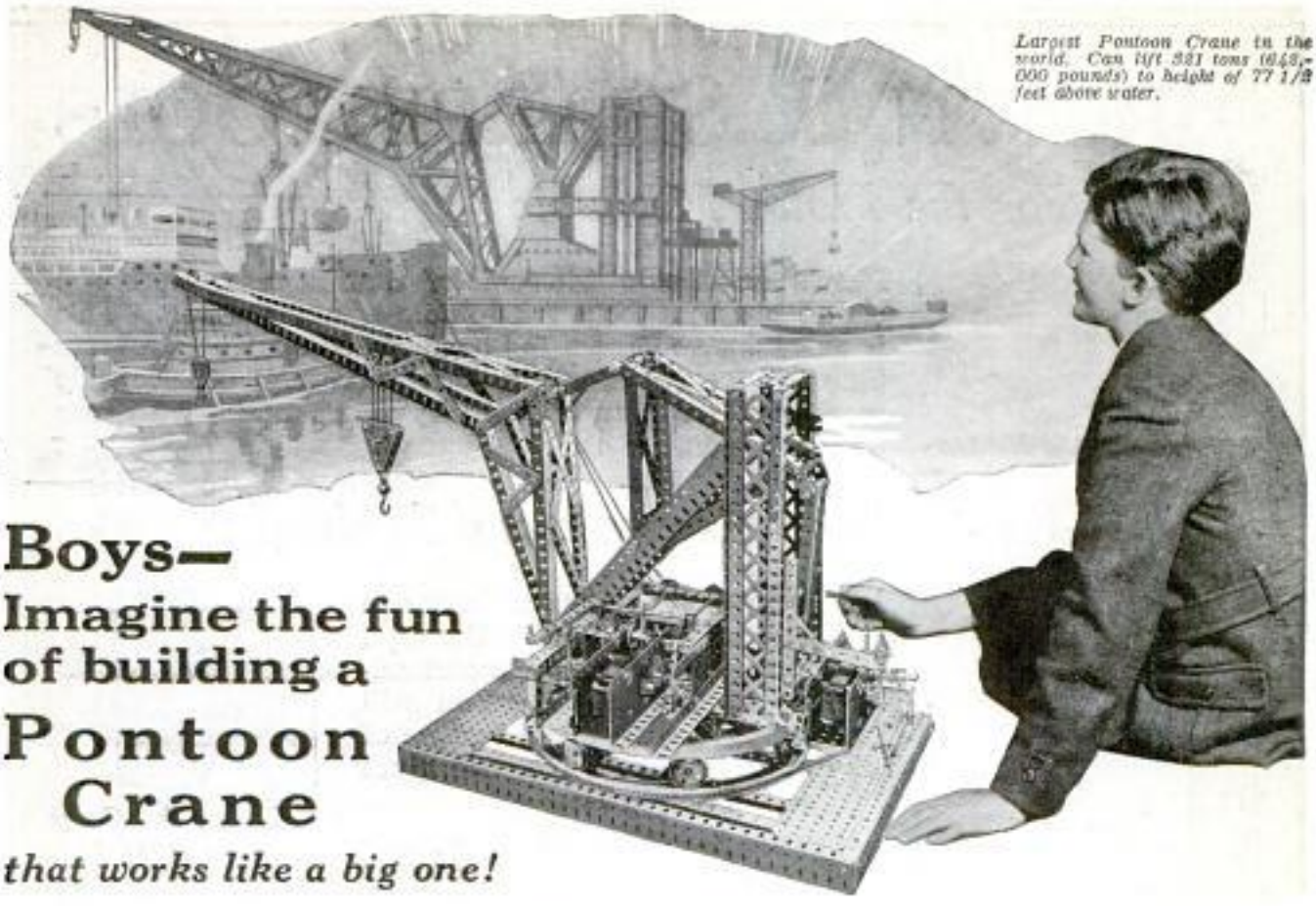

Largest Pontoon Crane in the world. Can lift 331 tons (648,000 pounds) to height of 77 1/2 feet above water.

Boys—
Imagine the fun of building a
Pontoon Crane
that works like a big one!

WOULDN'T it be fun to build a real Pontoon Crane? You can if you have a Meccano Outfit. Think of the fun of making it go—lifting a load and swinging it just like the real crane above. And your fun never ends, for with these same parts you can build Signal Towers, Bridges, Automobiles—anything you can think of.

There's no need to study with Meccano. An illustrated book showing how models are put together, comes with your Outfit.

MECCANO
Engineering for Boys

Meccano parts are real engineering parts in miniature—gears, pulleys, couplings, etc. —and they are so strongly and accurately made that they fit together perfectly. That's why it's dead easy to build with Meccano. Every Outfit is complete. The fun begins at once.

This Book Sent Free

Fill in the coupon, attach the names and addresses of three of your chums and we will send you absolutely free this Meccano book. Tells all about the joys of Meccano and many pages of models are shown—22 pages of pictures. *Send for it to-day.*

Meccano Company, Inc.
Division H-3 ELIZABETH, N. J.
In Canada:
Meccano Ltd., 45 Colborne St., Toronto

For sale at most department, toy, hardware and sporting goods stores. Sent direct on receipt of price if your dealer cannot supply you. Prices of Outfits from $1.00 to $45.00.

IMPORTANT NOTICE

Not all construction toys are Meccano. Meccano is the original Steel Construction Toy, has the greatest variety of parts and builds the most models. Insist on the genuine Meccano. This label is on every box.

MECCANO
CO., Inc.,
Div. H-3
Elizabeth, N. J.

Attached are names and addresses of three of my chums. Please send me your Meccano book.

My Name.....

.....

Street.....

City.....

State.....

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BROWN & SHARPE TOOLS

—For the Motor Mechanic

Inside Micrometer No. 264

Here's an Inside Micrometer that is new. It has a clamp nut that locks the spindle at any reading. This is an exclusive Brown & Sharpe feature. The Brown & Sharpe No. 264 takes cylinder bore and other inside measurements from 2" to 8" by thousandths with ease and precision.

—For the Shop Mechanic and Toolmaker

Adjustable Square No. 554

A tool kit isn't complete without one of these handy Adjustable Squares. Blades are interchangeable and adjustable to any length. You will find the reversible blade feature of the Brown & Sharpe No. 554 gives it an added handiness.

Thread Tool Gauge No. 577

Another new tool that proves its worth in actual use is Brown & Sharpe Thread Tool Gauge No. 577. Adjustable, for cutting tools, from a sharp "V" to a 1" flat. Made with three different angles — 60°, 55°, or 29° — and remarkably inexpensive.

—For the Apprentice and Home Mechanic

Set of Tools No. 847 is one an apprentice or home mechanic finds that answers his requirements. It has been especially made up for the beginner or home mechanic. This set represents an outfit of high quality tools at a moderate outlay. Tools are furnished in a neat, felt lined, leather case which helps to protect them from injury, dust and moisture.

Our new No. 29 Small Tool Catalog lists all the above and over 2000 other tools. It's a buying guide every tool user ought to have. Copy sent on request.

Brown & Sharpe Mfg. Co.

Providence, R. I., U. S. A.

BROWN & SHARPE TOOLS

"Standard of the Mechanical World"

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FARAWAY GETS STATIONS FAR AND NEAR—LOUD AND CLEAR

RADIO FANS TELL OF FARAWAY'S Amazing Long-Distance Performance

Hundreds of Fans Say They Get from 10 to 37 Stations in an Evening from New York to Los Angeles

Frankly, I'm real enthusiastic about your Faraway two-tube set, and you may be interested to know that so far I have been able to get more stations than I can count.

Here are some of them: KYW Chicago, WLW Cincinnati, WSAI Cincinnati, WOAT Wilmington, KSD St. Louis, WBAH Minneapolis, WJAZ Chicago, WOQ Kansas City, WMC Memphis, WHAM Rochester, WOO Philadelphia, WOS Jefferson City, KGO Oakland, Calif.

The range is all that could be expected and everything is loud and clear.

I am sure I will be able to sell a lot of them in the future.

Very truly yours,
E. R. CARTER, Forrest Hills, L. I.

"Crazy" About Faraway

My customers are just crazy about Faraway sets and I sell them as fast as I order them. We readily pick up Boston, Dallas, Frisco, Pittsburgh and many other stations.

R. J. ADAMSON, Brampton, N. D.

One Sells Another

I cannot imagine how you can manufacture these Faraway sets and sell them at your retail price. I have been interested in radio sets for several years and I recently had the privilege of "listening in" on one of your 4 tube sets and was surprised at the wonderful results. Send me your literature at once as I want to buy one.

M. N. JEFFERSON, Salt Lake City, Utah.

Get 30 Stations

Your 4-tube Faraway is fine. So far I've tuned in 30 known stations on the Loud Speaker. Send me a supply of order blanks and literature and expect many more orders.

A. E. CRAFTS, Pittsfield, Mass.

I have been using your 4-tube Faraway Radio set for some time now and I couldn't hope for better results.

I have received as many as 21 stations in one evening, including New York, Pittsburgh, Schenectady, Chicago, Havana, Omaha, Los Angeles, Dallas.

Although I have gotten between 125 and 150 stations, I continue to get new ones each night.

I am 100 per cent Faraway now and I am making a lot of money, as you can see from my orders, selling others.

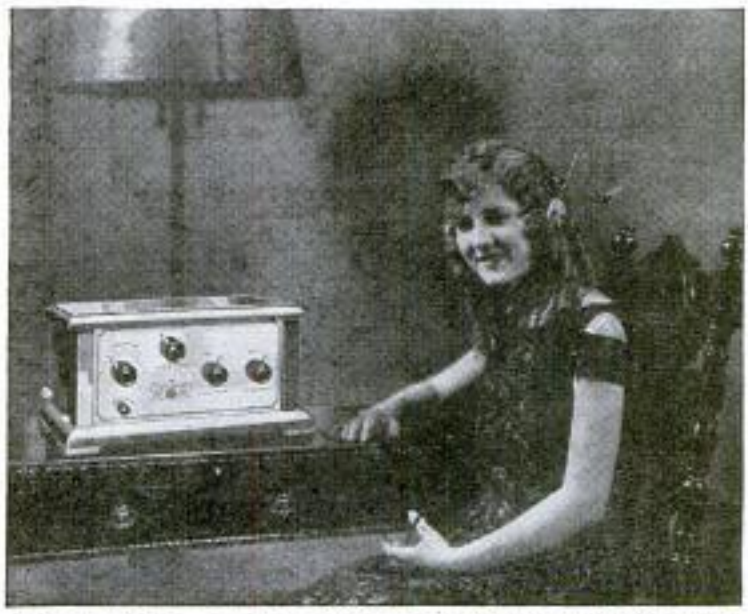
I would be glad to recommend the Faraway Radio to any one at any time.

Very truly yours,
FRANK A. COLLINS, Du Page County, Winfield, Ill.

Dealers Agents Our Faraway proposition offers tremendous possibilities for you. Write quickly for plan and territory.

MODEL F—4-Tube for use with Loud Speaker $59.50

MODEL R—2-Tube as shown in illustration at top of page, for use with Head Phones..... $29.50



You, too, can own a FARAWAY with our MONEY-SAVING plan

"I cannot imagine how you can manufacture these Faraway sets and sell them at your retail prices," writes S. M. Johnson of Salt Lake City, Utah. Mr. Adamson of Brampton, N. D., says, "We're all 'crazy' about the Faraway sets and I sell them as fast as I order them."

Almost every mail brings some enthusiastic report from a Faraway user. They do not realize that their successful experiences with Faraway are being duplicated night after night by thousands of Faraway set owners all over the country.

"The Faraway is the sweetest and clearest set I've ever listened to—no tube howls—no distortion—it's easily tuned and brings in fine volume. I have 143 stations logged so far and get new ones continually," writes J. D. Shoptaugh of Bellevue, Ky.

Operates with Dry Cells or Storage Battery

Faraway sets are easily tuned, extremely simple to operate and always dependable. They operate with either Dry Cells or Storage Batteries. The latest improved type of set construction used only on high priced sets is employed.

SATISFACTION GUARANTEED OR MONEY REFUNDED

We guarantee all the things our users claim—namely—clear, sweet tone—fine volume—coast to coast reception—can be logged—no tube howls, distortion or radiation. Furthermore, there's no set on the market that can compare with its beauty or fine workmanship under $100—and you'll agree with us when you see it. For Faraway Cabinets are ornamental and massive—beautifully done in mahogany and large enough to contain B Batteries. The panel is finished in dull platinum with all calibrations finely etched in black.

So Why Pay More? You'll wonder like Mr. Johnson how we sell Faraways at these low prices. **Our unique selling** plan is the answer. Don't buy your radio set until you see the Faraway. We have a big surprise for everyone who writes for our literature and money-saving proposition. Mail the coupon today.

THE FARAWAY RADIO COMPANY

652 West Third Street CINCINNATI, OHIO

MAIL THIS COUPON

THE FARAWAY RADIO CO., Dept. "B"
652 W. Third St., Cincinnati, Ohio

Gentlemen: Without obligation send me:

☐ Your literature and details of money-saving proposition. ☐ Agents' Proposition. ☐ Dealers' Proposition.

Name .....

Address .....

City and State .....

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Holtzer-Cabot

LOUD SPEAKER

IF you want a Loud Speaker which brings in volume so that you don't have to strain your ears to hear it—which in spite of its power does not distort, but makes Radio reception a musical and artistic pleasure—which is sensitive to every tone so that a piano sounds like a piano and not like a tin pan—which is so beautiful that it harmonizes with any surroundings, this new Holtzer-Cabot National is the Loud Speaker for you. Furthermore, its price—$12.00—has established an entirely new standard of value in Radio.

A New Standard of Quality

ONLY $12.00

Dept. P. M.

THE HOLTZER-CABOT ELECTRIC CO.

125 Amory Street, BOSTON — 8461-65 South State St., CHICAGO

Holtzer-Cabot

Have YOU Seen This Blotorch?

TURNER BLOTORCH
Safe as a Candle

No. 45

It has the Turner patented Baffle and Heater Plug, making it possible to use present-day grades of gasoline or kerosene, effecting 400 degrees more heat.

The Torch that Experts Use

Automatic Safety Valve—Turner patent—and Leakproof Brass Tank eliminate all possibility of danger from leaks or excess pressure. Separate Needles for fuel control and ejection prevent orifice troubles—a nuisance common to ordinary torches. Comfortable Pistol-Grip Handle. Get a Turner from your dealer NOW—it serves a score of purposes. And it's FEARLESSLY GUARANTEED.

CAPACITY—1 Quart

$8.25

THE TURNER BRASS WORKS
Industry Ave., SYCAMORE, ILL.

The World's Largest Exclusive Manufacturers of Blow Torches, Fire Pots and Brazers

RADIO TEXT BOOK & CATALOG FREE

Contains—
75 Radio "Hook-Ups"
300 Illustrations
556 Articles
84 Pages
"Build Your Own with RASCO Parts"

RADIO SPECIALTY Co.
98-E Park Place, NEW YORK, N. Y.

N&K
Imported
LOUDSPEAKER
TYPE W

New in principle, new in shape, new in quality of reproduction, price $27.50.

Made by the makers of the famous N & K Head Set, Model D, 4000 ohms, price $8.50.

TH. GOLDSCHMIDT CORP.
Dept. M-1, 15 William Street, New York

Como Duplex Transformers

(Push Pull Power Type)

Price $12.50 Per Pair

The Como Duplex system of audio frequency amplification (push-pull) gives the maximum volume without distortion and tube noise. There is a combined filtering action which assures perfect results when ordinary amplification transformers fail. Can be used as a single-stage, two-stage, or a three-stage amplifier.

The World's Standard Push Pull Transformer

Send for copy of "How to Build a Power Amplifier."

COMO APPARATUS CO.
446 Tremont Street - BOSTON, MASS.

HONEYCOMB COILS

The Universal all-wave inductance. Back and front panel mountings. Send 25c for Super Het., R. F. and Honeycomb Coil Circuits and Complete Catalog.

Chas. A. Branston, Inc.
853 Main St. Buffalo, N. Y.
Chas. A. Branston, Ltd., Toronto

LATEST WHOLESALE RADIO CATALOG FREE

Simply send name TODAY for big 48-page catalog of latest radio goods at Wholesale. *Live dealers and agents wanted.*

STANDARD RADIO CO., 102 East 13th, Kansas City, Mo.

The Triple Duty Charger

Charges radio 2, 4 or 6 volt "A" battery, radio "B" battery up to 120 volts and auto batteries from lamp socket. Average cost per charge about a nickel. Solidly built—will not get out of order. Fool-proof and simple. The first successful charger—introduced over ten years ago. Type A. B., price $20; West of Rockies, $21. Type 6 for 6 volt "A" or auto batteries, price $16; West of Rockies, $16.50. "B" battery charging attachment, $2.50 extra. Write for literature and name of dealer who will supply you with the genuine FF charger.

FRANCE MFG. CO.
10424 Berea Road CLEVELAND, OHIO

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Of Course It's a CROSLEY

Better-Costs Less Radio

"OH boy! There's the West Coast! Last night I had the East Coast, and the night before that, Havana. I bet I get London soon. This Crosley sure does bring 'em in. I can tune out local stations any old time and get what I want. There's nothing like a Crosley!"

That's what thousands of men, women and boys are finding out every evening in all parts of the United States. So enthusiastic are they that hundreds of voluntary letters tell us daily of the really remarkable performances of Crosley Radios and the complete satisfaction that they give. Here is what a few of them say:

Parkersburg, W. Va. September 30, 1924.
"Wish to congratulate you on the one-tube Crosley 50. Have listened to Havana, Cuba, and as far west as Oakland, Los Angeles and San Francisco. This is what I call a wonderful set."

Rockville, Maryland. October 1, 1924.
"I thought it would interest you to know that on September 15, I received Oakland, California, on my two-tube Crosley 51. That station is 2,434 miles from here. I had a hard time making my friends believe it until I wrote to California and had them verify what I heard. As soon as I can afford it, I expect to get a Trirdyn."

Olney, Illinois October 15, 1924.
"I'm getting stations from New York to Seattle, Wash., on my Trirdyn. Monday night, October 13th, I received clearly and plainly the announcer and music from Honolulu, Hawaiian Islands, 7,000 miles away. My machine is not for sale."

(Names upon request)

BEFORE YOU BUY—COMPARE
YOUR CHOICE WILL BE A CROSLEY

For Sale By Good Dealers Everywhere

Crosley Regenerative Receivers are Licensed under Armstrong U. S. Patent 1,113,149. Prices West of the Rockies add 10%

Write for Complete Catalog

The Crosley Radio Corporation

POWEL CROSLEY, JR., President

115 Sassafras Street Cincinnati, Ohio

Crosley Owns and Operates Broadcasting Station W L W

Crosley Head Phones Better — Cost Less $3.75

Crosley One Tube Model 50, $14.50
With tube and Crosley Phones $22.25

Crosley Two Tube Model 51, $18.50
With tubes and Crosley Phones $30.25

Crosley Three Tube Model 52, $30.00
With tubes and Crosley Phones $45.75

Crosley Trirdyn Regular, $65.00
With tubes and Crosley Phones $80.75

Crosley Trirdyn Special, $75.00
With tubes and Crosley Phones $90.25

Mail This Coupon At Once

The Crosley Radio Corp'n.
115 Sassafras Street,
Cincinnati, O.

Mail me, free of charge, your catalog of Crosley receivers and parts.

Name_____

Address_____

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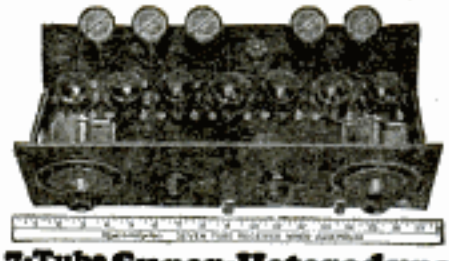
APEX VERNIER DIAL

It Brings 'Em In!

Get more stations—greater range—bigger volume—finer selectivity—less interference. Lasts forever. The one big advance yet made in tuning. Ratio 12 to 1. Quickly applied to any shaft. For sale by all good Radio Dealers. If unable to obtain from dealer, enclose $2.50 for nickel-silver finish, or $3.50 for De Luxe satin finished gold.



7-Tube Super-Heterodyne for $97.50

Receive the parts complete to assemble your own set. Coast to coast on an 18-inch Loop. Assemble this 7-tube Microdyne Super-heterodyne on a 7x18 in. panel in three hours. Parts complete, including drilled and engraved panels, condensers, sockets, transformers, dials connecting plugs, cables, etc., with drawings, diagrams and instructions. Price of cabinet—to fit—on application. If your radio dealer cannot supply parts for complete Microdyne Radio Set, send check or money order for $97.50 and name of your dealer.

APEX ELECTRIC MFG. CO., Dept. 101
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RADIO
Storage "B" Battery

12 Cells 24 Volts *Lasts Indefinitely—Pays for Itself*

For a limited time only, and to introduce this new and superior Storage "B" Battery to the public, we are selling it direct to the consumer for $3.50. Regular retail price is $5.50. You save $2.00 by ordering NOW.

Equipped with *Solid Rubber Case*, an insurance against acid and leakage. Extra heavy glass jars. Heavy, rugged plates.

Takes place of dry "B" batteries and will last indefinitely. Recharged at a negligible cost. Eliminates many noises so often blamed on "static". Order yours today!

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Makers of the Famous World Radio "A" Storage Battery.
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Guaranteed in writing for two years.

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RADIO SETS,
Parts and Accessories

Only $21.95 for 1-tube outfit, receiver parts unassembled; often receives over 1,000 miles. **Only $53.78** for 2-tube outfit, receiver assembled; often receives over 1,000 miles on loud speaker. **Only $85.09** for 3-tube Neutrodyne outfit, receiver parts unassembled; has received England. These prices include all accessories, aerial, etc.—everything needed for receiving on head phones. Also, **Crosley receivers, 10% off,** 25 other popular sets away down.

Very interesting

It's easy to do business with us, for this is "The Radio House of Friendly Service." All goods offered subject to examination and approval. No money in advance. Quick shipment. We pay transportation anywhere in U. S. *Satisfaction or money back.* Your radio questions answered free. **Get this wonderful catalog**—you need it—**write today! Don't delay!**

(And will you be so kind as to add the names of several friends you believe will soon want radio goods? Thank you!)

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Cut Prices on Radio

Save 25 to 50 per cent. Standard Sets, all types, $5.00 to $79.00. Everything in accessories Wiring diagrams and estimates free. 150,000 customers. Money-back guarantee. Immediate delivery. Illustrated catalog on request. Special proposition to community agents.

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IMPERIAL LABORATORIES, Coca Cola Bldg., KANSAS CITY, MO.

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To Dealers Who Buy Nationally Advertised Radio Goods from Our Bargain Catalog! *Write for It Today!*

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VOTE *for* TOWER'S Scientifics

UNDISPUTED LEADERSHIP

All the quality of phones selling at much higher prices. Ask your dealer or order direct.

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Scientific

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$3 DOWN and it's YOURS

The Greatest Typewriter Bargain Ever Offered

Right now we are making you the greatest typewriter offer you ever dreamed of—an eye opener. This wonderful standard Shipman-Ward Rebuilt Underwood only $3.00 down. Ten days' free trial and the easiest monthly payments, shipped direct to you from our big factory.

10 Days' Free Trial

Yes, only $3.00 down puts this genuine late model Shipman-Ward Rebuilt Underwood in your home. You can try it, test it, and then decide. See for yourself how new it is, how it writes. You must be satisfied. Your $3.00 unconditionally returned if at the end of ten days you are not satisfied. The entire transaction will not cost you one cent.

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Little more than rental. Balance of payments so small you will hardly notice them, while you enjoy the use of this wonderful machine. You don't have to scrimp and save to pay cash. All at a big saving to you.

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With every typewriter we give a written guarantee. These machines are rebuilt like new by the famous SHIPMAN-WARD PROCESS. Equipped with late improvements. You can't tell them from a new machine. The world's standard typewriter, the same models as sold by the Underwood Typewriter Company today, at a big saving to you. Act now! Get this splendid offer and save money.

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These machines are shipped direct from our factory—the largest typewriter rebuilding plant in the world. They are rebuilt by the famous SHIPMAN-WARD PROCESS. Developed through 30 years in the typewriter business. Through our money saving methods of rebuilding and elimination of a large expensive sales force we are able to make this wonderful money saving offer to you. ACT TODAY, take advantage of it and you will SAVE MONEY.

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The Last word in Radio Re-Creation

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on brand new fully guaranteed, nationally advertised radio apparatus. We buy up manufacturer's and government surplus stocks, jobber and dealer bankrupt stocks, etc. Our enormous buying power permits us to pay spot cash and get rock-bottom prices—even way below manufacturer's costs. That's why our catalog is crammed with thousands of wonderful radio bargains. That's why we GUARANTEE to save you money.

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converts any ordinary cook stove into a gas stove. OXO-GAS is made from kerosene and air. Cheaper, cleaner and more efficient than coal. Responsible distributors wanted.

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SRACO head sets—2000 Ohms—lead bands and cord complete. Extremely sensitive. Write Dept. 1 for wonderful catalog. **$2.69**

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will work 400 to 1000 miles if made by my plans. No tubes or batteries. Copyrighted plans $1.00; or furnished FREE with complete parts for building set, including special coil and panel correctly drilled, for only $5.00. Satisfaction guaranteed or money refunded. Satisfied customers everywhere. Particulars free.

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With New HB 8 Hour Battery Charging Outfit. HB Users everywhere are **adding $150 to $300 monthly to their income with HB Constant Potential One-Day Battery Charging.** No experience needed. **Outfit comes complete with all necessary equipment for only $35 cash.** Your big monthly profits easily carry the small monthly payments. **Free trial on money-back guarantee.** More HB's in use than any other make. **Write for free bulletin 257.**

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This Artistic, dependable Ladies' Wrist Watch, fitted with genuine Illinois Springfield movements. A perfect timepiece. Beautiful 14 Karat white or green solid gold cases. Ask for New Watch Book showing cases in all the new shapes and designs. Watch sent on approval and sold on payments.

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Ask for our Beautiful Diamond Book FREE. Shows all the new styles in rings and tells about our rock bottom prices and our charge account plan.

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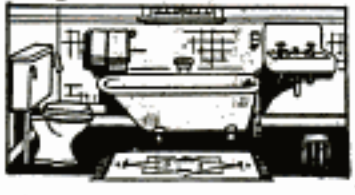
Combination Screen and Storm Door. Size 2/8x7/1, quickly changed, each **$6.77**

2 light 24"x20" glazed, checkrail windows, 1-3/8" thick, outside measure 2/4-1/8x3/10, each **$2.50**



The bathroom outfit shown includes bathtub five feet long, white porcelain enameled on the inside, low pattern white tank closet outfit and white porcelain enameled lavatory complete with all fittings above floor line, special at..... **$65.00**

Clear White Pine Storm Sash with frames, 1-1/8" thick. Best clear glass, each light 8x10. Outside measure 1/9x3/11½, each..... **$1.53**

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Starting troubles eliminated. Winter is here—Get yours—Step on the gas and you're off. Easily installed without alterations to car by anyone in a few minutes between Carburetor and Manifold.

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Money back if not satisfied.

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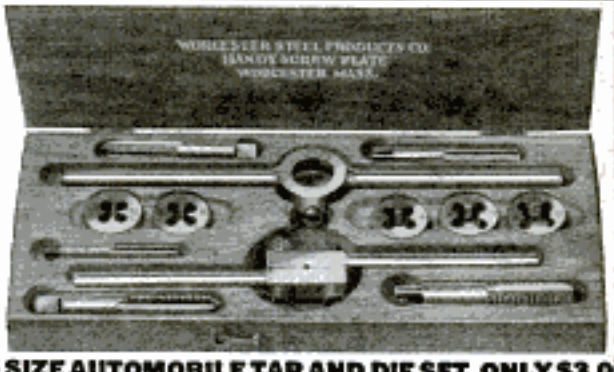

5 SIZE AUTOMOBILE TAP AND DIE SET, ONLY $3.00

DIRECT FROM THE FACTORY TO YOU! Our No. 12 Automobile Set furnished in our highly finished chestnut box contains 5 **each** taps and dies (1-4, 5-16, 3-8, 7-16 and 1-2"), in the S.A.E. thread, 1 die stock, and one tap and reamer wrench. Our No. 11 Set is the same as No. 12 except that the thread is U.S.S. instead of S. A. E. You are purchasing a splendid set at a very low figure. **Send us your order at once and be one of our many satisfied customers.** Let us also send you one of our circulars illustrating our full line of Handy Tools. **WORCESTER STEEL PRODUCTS CO., DEPT. 41, 25 UNION ST., WORCESTER, MASS., U.S.A.**

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Why not leave the rut and get into a business that pays real money—dignified work—Be a McSweeny Trained Big Pay Man! It's easy and it will only take you eight weeks. Are you willing to take eight weeks out of your life and spend them working in overalls with dirty hands, if you were sure you were going to benefit your position in life? Of course you are! Read every word of this and my other announcements on pages 50 and 51, also on the inside front cover of this magazine—Fill in the coupon and start on your way to being a McSweeny Trained Man.

Why McSweeny Trained Means BIG PAY JOBS

Because employers all over the country recognize the fact that McSweeny men are the best mechanics they can get—because their training is so thorough that they can be given a job and told to go ahead. McSweeny Trained Men need no supervision.

I Use Up-to-Date Equipment Only

My two training shops—one in Cincinnati, the other in Cleveland—are filled with the most modern and up-to-date equipment and machinery—and you work on every bit of it—nothing in either of my shops is for show.

I use the highest paid Instructors

Only the best instructors in the country can work for me—they must *know* their stuff—and not only that, they must be able to teach it to you, so that you will know as much about it as they. My strict method of supervision keeps them on their toes. They are all giving you the best they have all the time—and their best is the best money can buy.

I OPERATE TWO BIG SCHOOLS

For your convenience, I carefully selected the locations of my Schools, Cleveland and Cincinnati, Ohio, because they are nearest to the most automobiles on the roads—the ones which need repairing—the ones which you will work on. Both Schools are operated on the same high scale.

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For a limited time, I am going to pay your Railroad Fare to my nearest School and give you your board free for eight weeks. Send the coupon now—today—this minute, for my full particulars.

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Auto, Tractor and Electrical

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See my announcements on Pages 50-51, and on the inside front cover

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Send me your 64-page catalog and full particulars of your special offer, including free Railroad Fare and Free Board.

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Did you ever notice that the fellow who turns out the professional looking jobs—is a crank about the pliers he uses? Next time you're around, drop into your hardware store and get the feel of a pair of Klein's in your hands — then you'll know. They've been standard in big electrical companies for over half a century!

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WORLD'S LARGEST MANUFACTURERS

YOU CAN MAKE $18 DAILY PROFIT

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Giving These $1.25 Dress-Making Shears **FREE**

With each sale of our wonderful 11 piece Toilet Article Assortment for only $1.75. TOTAL STORE VALUE $4.60

$18.00 a Day PROFIT on only TWENTY Sales

Lucky 11 Toilet Set—Retail Value $3.35!

MY! HOW THEY SELL!

You get the attention with the free Shears. Walter Harris sold 800 boxes in six weeks. Profit over $100 a week. You can do this too.

Act Now! Sell like hot cakes year round. A baby could sell Lucky 11. Don't wait a minute. Save time. Send $1.75 for complete outfit including display case. At least write for circulars explaining our unique plans, including 30 other packages. **ACT NOW!**

E. M. DAVIS CO., Dept. 5625, CHICAGO, ILL.

LYON BODIES

Send For Our 1924
FREE BOOK OF BARGAINS
Containing a full line of bodies and accessories at exceptionally low prices. **Buy direct from the factory.**

$27.50 AND UP

AUTO TIRE SALES CO.
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HANDS UP!

Protect yourself against hold-up, rowdies, etc. with this clever cigarette case of light weight metal. Looks exactly like the real thing! Pull the trigger, back flies the lid showing your cigarettes. **Lots of fun** scaring your friends, and a great protector. Sold exclusively by us. **PAY POSTMAN $1.79 on delivery plus postage. Money back if not satisfied.**

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12,000 MILES GUARANTEED
Lowest Wholesale Prices in America. Shipped prepaid on approval. Make big money all or part time. No capital or experience. Sample sections furnished.

YOUR TIRES FREE! Simply send name today for valuable FREE BOOK, tells how thousands have gone into big business. SPECIAL AGENTS' OFFER Wholesale Prices and FREE SAMPLE KIT.

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For a Merry Christmas—for a merry time every day and for many years to come—give your loved ones a Thompson Radio Receiving Set, a Thompson Speaker, or both.

THOMPSON RADIO

Thompson Radio Receiving Sets and Thompson Radio Speakers deliver the highest quality of simplified and economical radio entertainment. Both nearby and distant radio programs cannot be more faithfully reproduced than with a Thompson Radio Receiving Set.

One of the many reasons for the advanced development and perfection in Thompson Radio products is an organization composed of radio engineers who have been making radio apparatus *exclusively* ever since "radio" was called "wireless."

The 5-tube GRANDETTE is $125. The 5-tube PARLOR GRAND, (shown in large picture below) is $145. The 6-tube CONCERT GRAND, is $180. Prices are without tubes or batteries. The Thompson Speaker, with conical diaphragm and other special features, is now $28.

If your dealer does not handle Thompson Radio products, write direct to us for attractive literature and name of dealer near you.

R. E. THOMPSON MANUFACTURING CO.

Manufacturers of Radio Apparatus for the U. S. Army and Navy and many foreign governments

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FACTORY:
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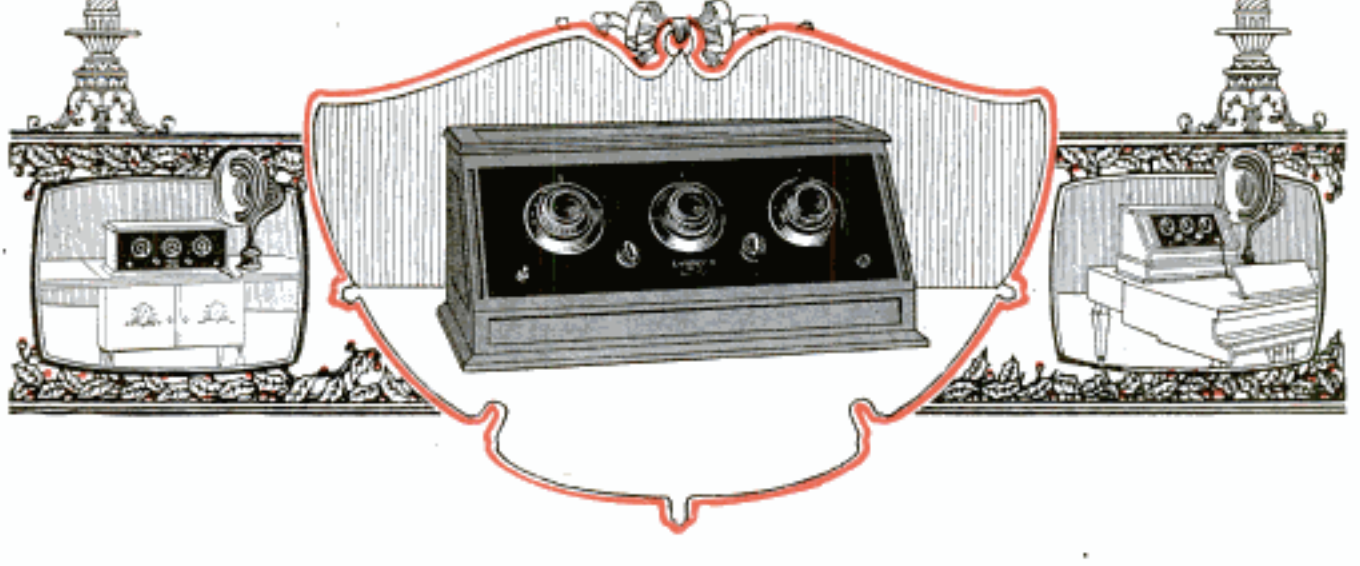

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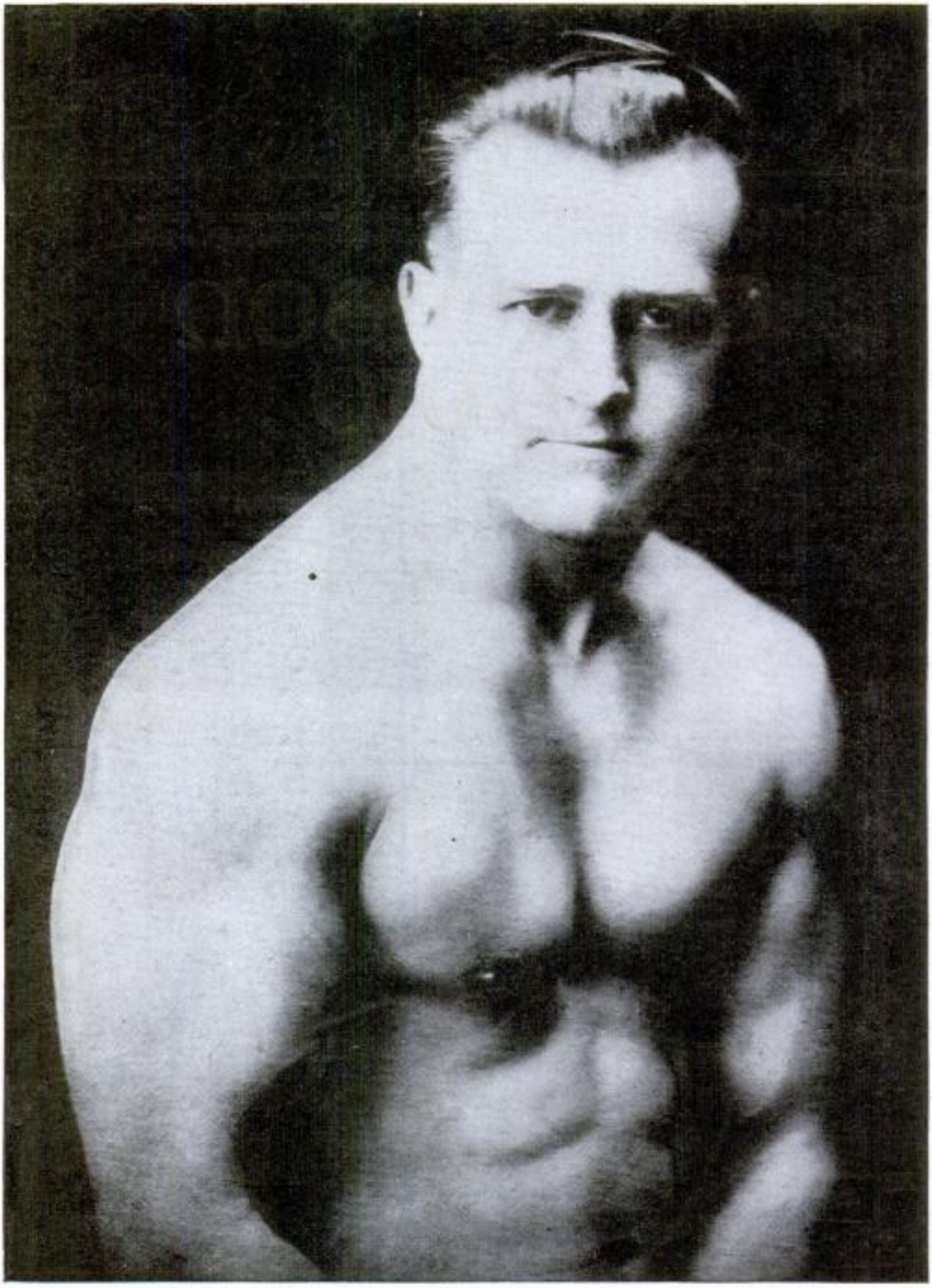

EARLE E. LIEDERMAN, *The Muscle Builder*
Author of "Science of Wrestling", "Muscle Building" and "Here's Health"
(See pages 14 and 15 in front of book)

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Start the New Year Right

Will 1925 Bring Success or Failure?

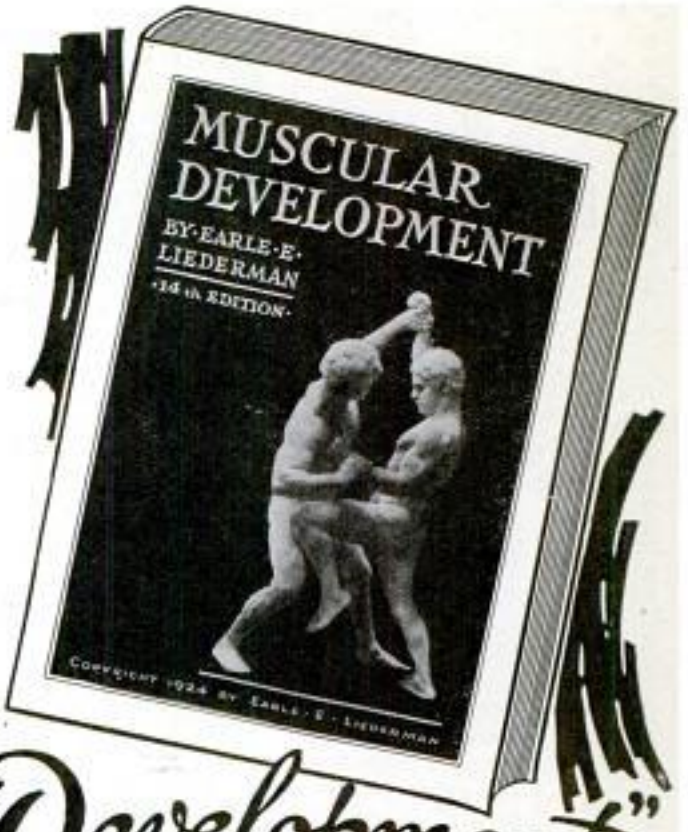
Right now is the time to decide. If you had started right one year ago, you would be on the high road to success this very minute. Don't let another year pass you by. It is within your power to make yourself just what you will. Make this day the beginning of a new life and a better one.

I Will Give You Wealth, Health and Happiness

I will transform that body of yours and make you physically perfect. I will make a real *he* man out of you. I will build out your chest so that every breath means increased life, purifying your blood and sending vim and vitality throughout your entire system. I will broaden your shoulders and give you the huge muscular arms and legs of an athlete. I will put pep in your old backbone and strengthen every vital organ within you. You will be just bubbling over with life, having the keen, alert brain, the bright flashing eyes and the spring and step of youth. You will be admired and sought after in both the social and business world. You will be a leader of men, and the good things of life will naturally come your way.

I Challenge the World

If a man stood on the housetops and shouted to the people that he was the strongest man on earth, it would avail him nothing. Someone would make him come down and prove it. But records speak for themselves. I will gladly show anyone personal letters from the leading strong men in the world today that my course is absolutely the best and the quickest to acquire physical perfection. Come on then and make me prove it—I like it. I have the means of making you a perfect physical specimen of manhood, of making you a successful leader of men. You will be a credit to your community. I have done this for thousands of others. What I have done for them I will do for you. I don't care what your present condition is. The weaker you are, the more noticeable the results. Come on then, start the New Year right.



Send For My New 64 Page Book "Muscular Development"

IT IS FREE

It contains forty-three full-page photographs of myself and some of the many prize-winning pupils I have trained. Some of these came to me as pitiful weaklings, imploring me to help them. Look them over now and you will marvel at their present physiques. This book will prove an impetus and a real inspiration to you. It will thrill you through and through. All I ask is ten cents to cover the cost of wrapping and mailing and it is yours to keep. This will not obligate you at all, but for the sake of your future health and happiness, do not put it off. Send today—right now, before you turn this page.

EARLE E. LIEDERMAN
Dept. 2001, 305 Broadway, New York City

EARLE E. LIEDERMAN
Dept. 2001, 305 Broadway, New York City

Dear Sir:—I enclose herewith 10 cents for which you are to send me, without any obligation on my part whatever, a copy of your latest book, "Muscular Development." (Please write or print plainly.)

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Street.....

City.....State.....

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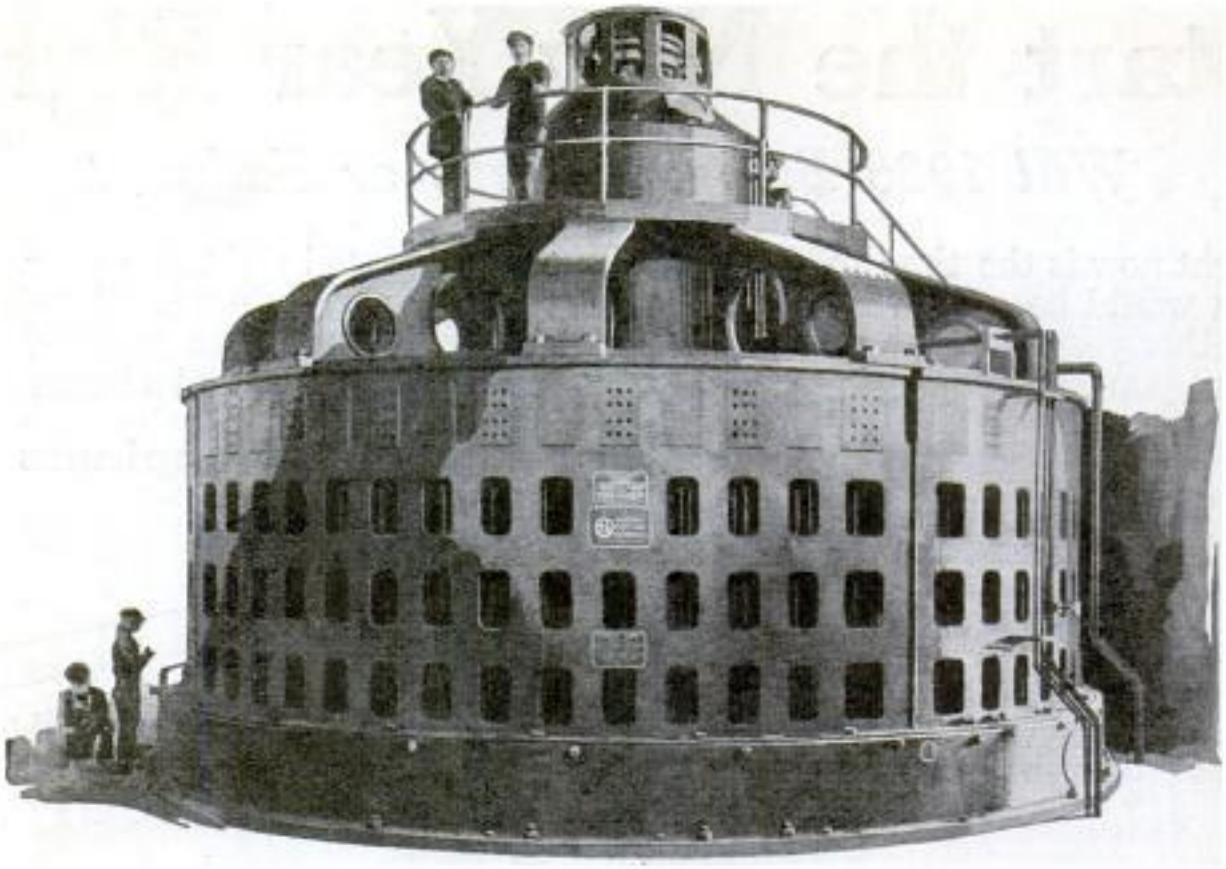

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On this machine is a name plate bearing the monogram of the General Electric Company—the same monogram that is on the little motors that run labor-saving household machines for you. This monogram is more than a trade mark; the letters G-E are the initials of a friend.

This is the largest hydro-electric generator in the world, one of three new giants installed by the Niagara Falls Power Company. Two million people share in the increased electric light and power supplied by these great generators.

Each of these machines will save the equivalent of 700,000 tons of coal a year.

GENERAL ELECTRIC

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Big Radio Book

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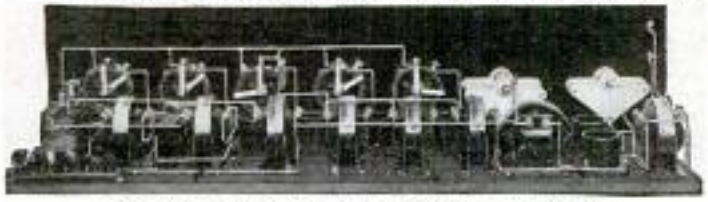

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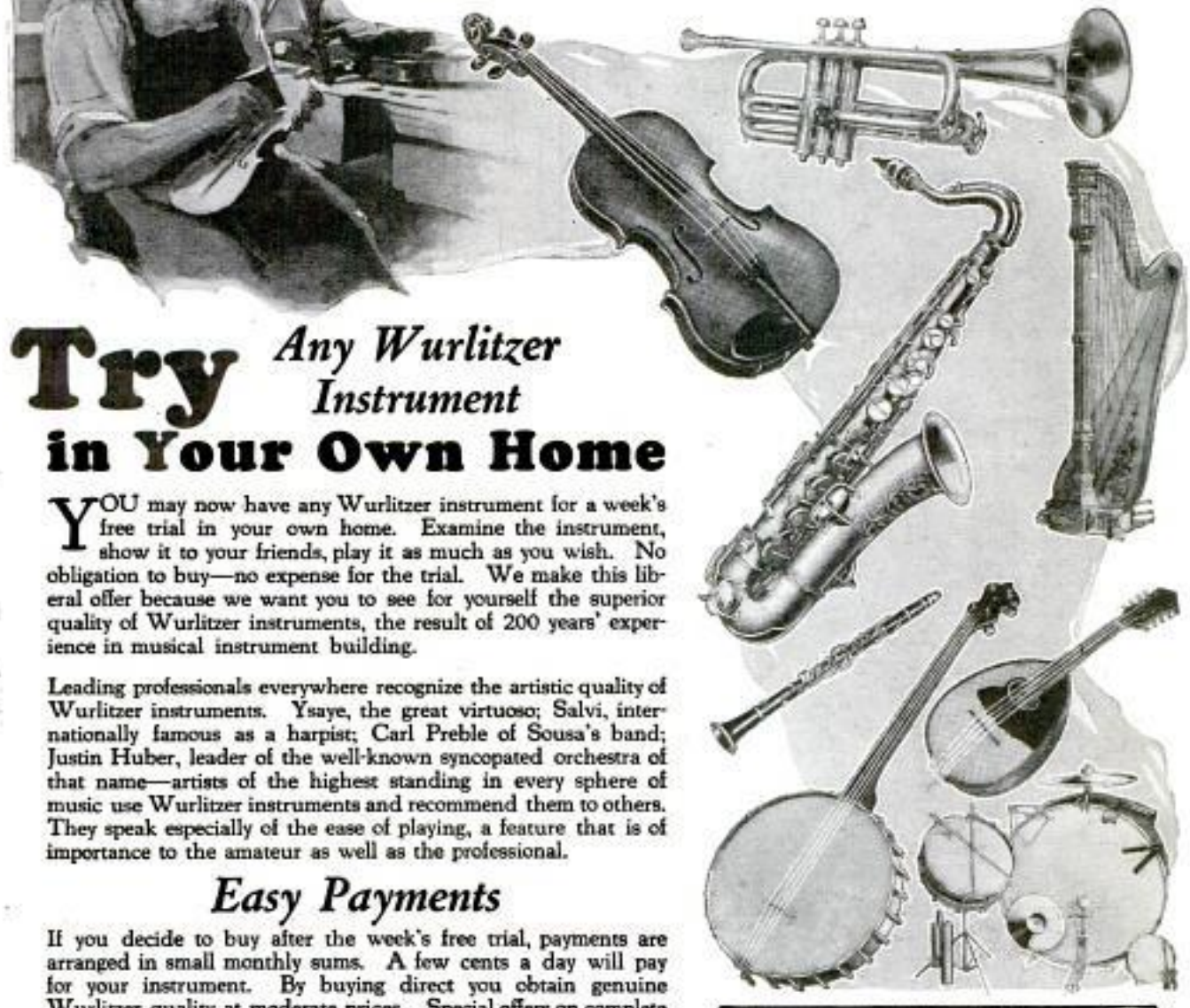

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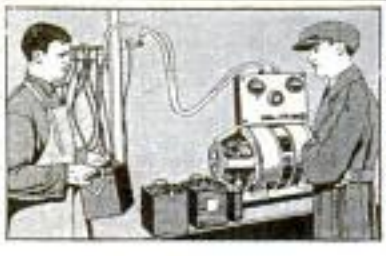

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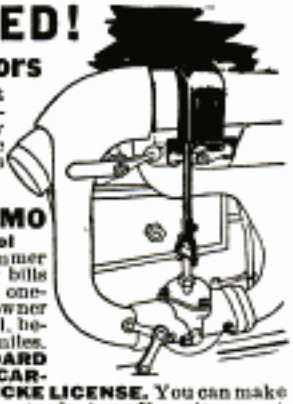

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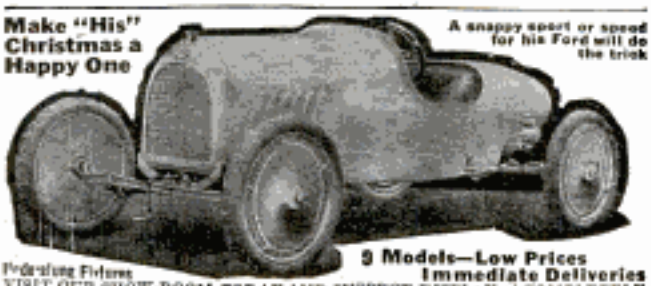

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This is the famous L. C. Smith typewriter which has set the world's standard for quality and service for over twenty years. Perfect machines. Standard size. Has the full correspondence keyboard of 76 characters—single shift—universally used in teaching the touch system. The entire line of writing completely visible at all times, has the decimal tabulator, the two color ribbon, with automatic reverse, the back spacer, **ball bearing** type bars, **ball bearing** carriage action, **ball bearing** shift action. Every late style feature and modern operating convenience. Comes to you with everything complete; tools, cover, operating book and instructions—nothing extra to buy. **You cannot imagine the perfection of this beautiful typewriter until you have seen it. We do the most perfect and highest class job of rebuilding known to the typewriter industry. We have sold thousands of these perfect late style machines at this bargain price and every one of these satisfied customers had this splendid, strictly up-to-date machine on ten days' free trial before deciding to buy it.** We will send it to you F. O. B. Chicago for ten days' free trial. It will sell itself, but if you are not satisfied that this is the greatest typewriter you ever saw, you can return it at our expense. You won't want to return it after you try it, for you cannot equal this wonderful value anywhere.

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The Drill with the *unbreakable* Ratchet

HUSKY, handy, compact, easy-working, trouble-proof—that's this Goodell-Pratt hand and breast drill.

The big feature is the perfected, never-fail ratchet mechanism. The strength of the ratchet is due chiefly to the fact that the teeth are broached on the inside of the drop-forged crank hub, then case-hardened. The dogs are of hardened steel and so located that the force is almost entirely compressive — there is almost no shearing action. Ratchet is both right and left hand—operated by turning the knurled ratchet dial.

This drill has two speeds, controlled by turning the shifter knob. Steel spindle runs in ball bearings. Polished hardwood handle, and side handle.

The all-steel chuck has three hardened jaws for holding round shank drills 0 to 3/8 inch.

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In the Goodell-Pratt Catalog No. 15 are shown many other essential tools for the amateur mechanic. Write for it.

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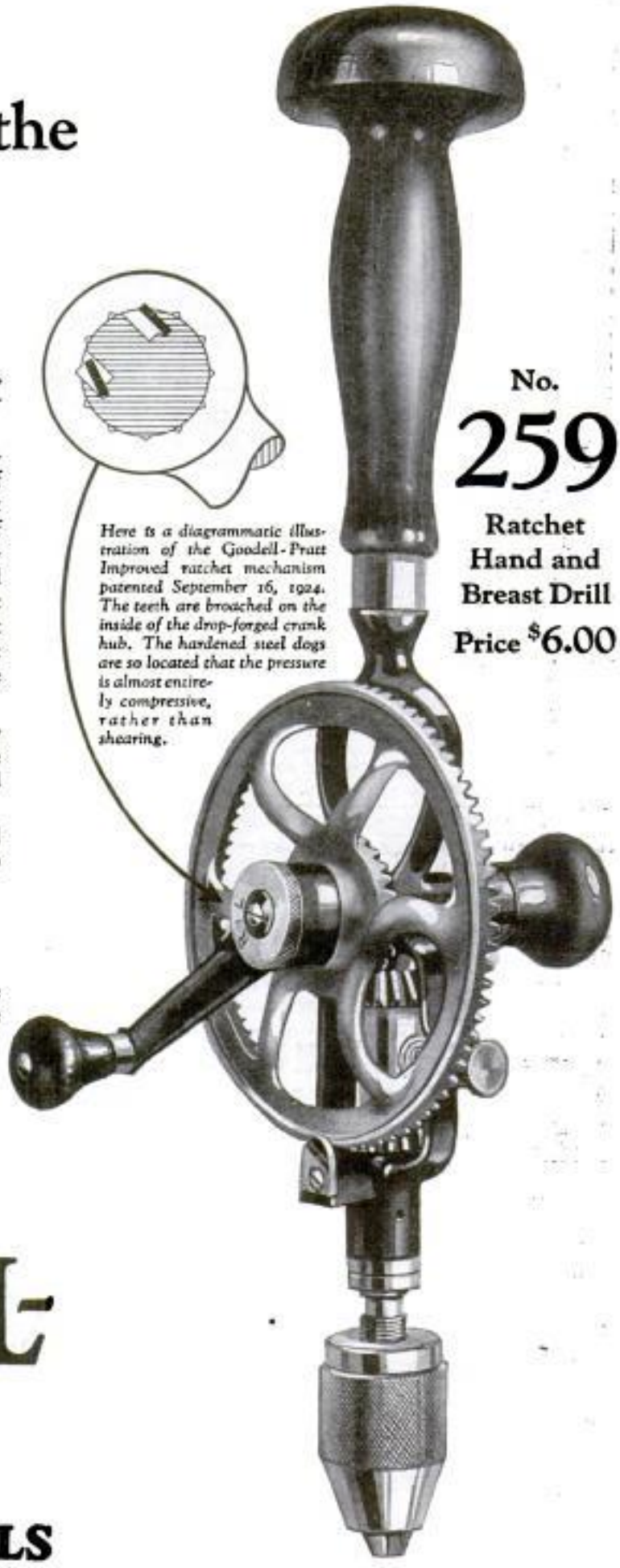
GREENFIELD, MASS., U. S. A.

Toolsmiths

Makers of Mr. Punch



Here is a diagrammatic illustration of the Goodell-Pratt Improved ratchet mechanism patented September 16, 1924. The teeth are broached on the inside of the drop-forged crank hub. The hardened steel dogs are so located that the pressure is almost entirely compressive, rather than shearing.

No. 259
Ratchet Hand and Breast Drill
Price $6.00

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1500 GOOD TOOLS

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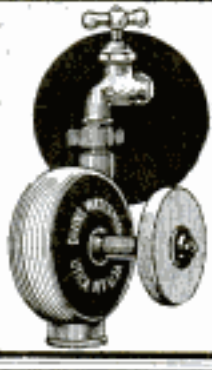

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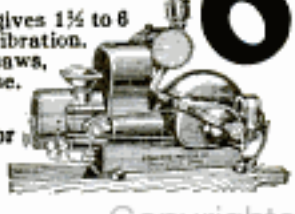

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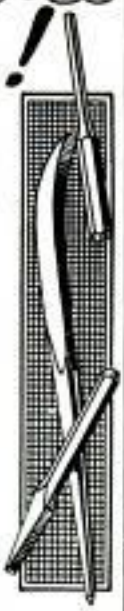

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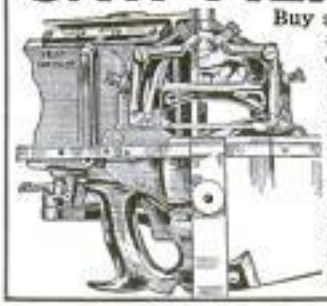

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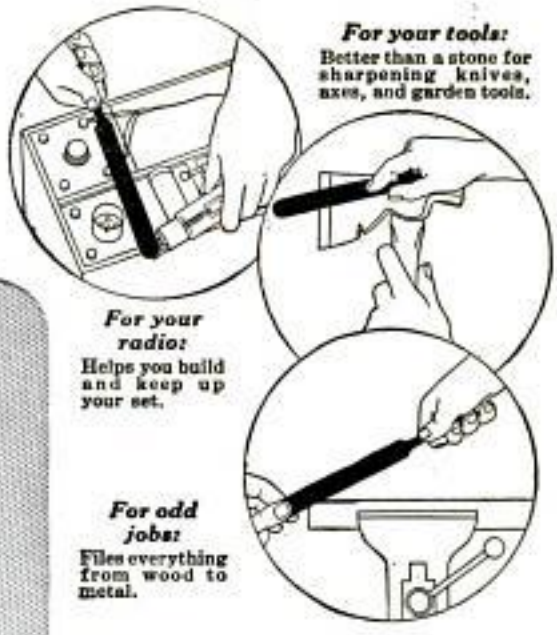

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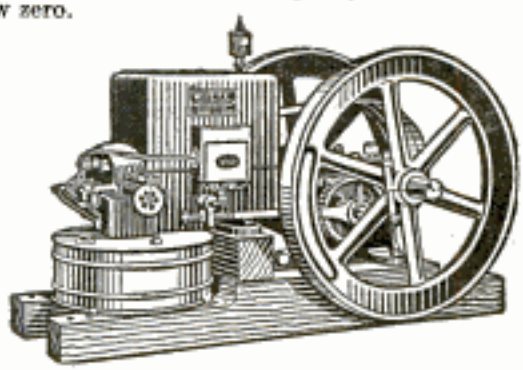

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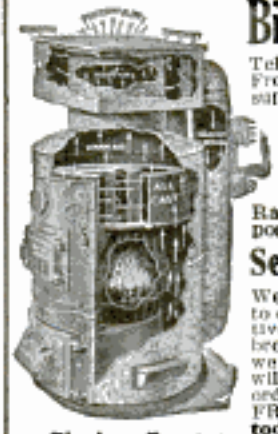

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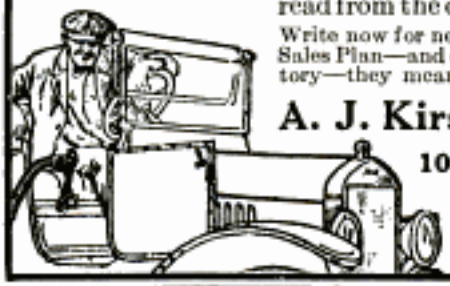

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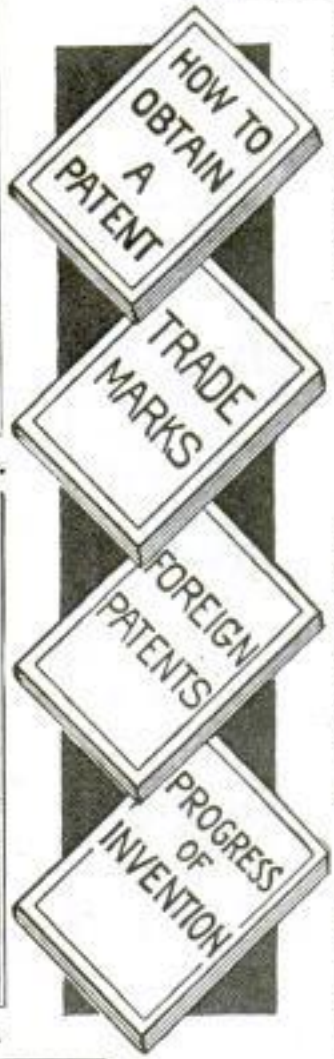

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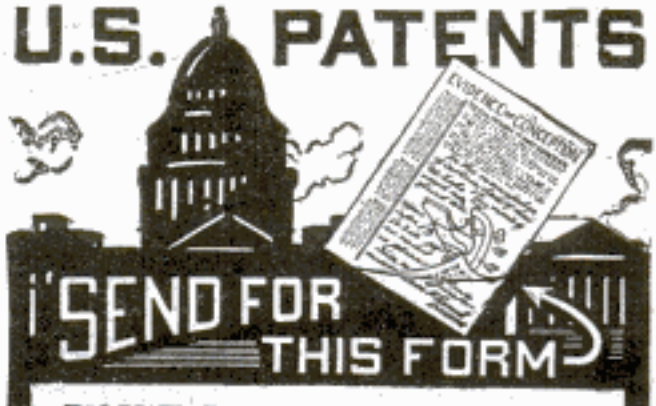

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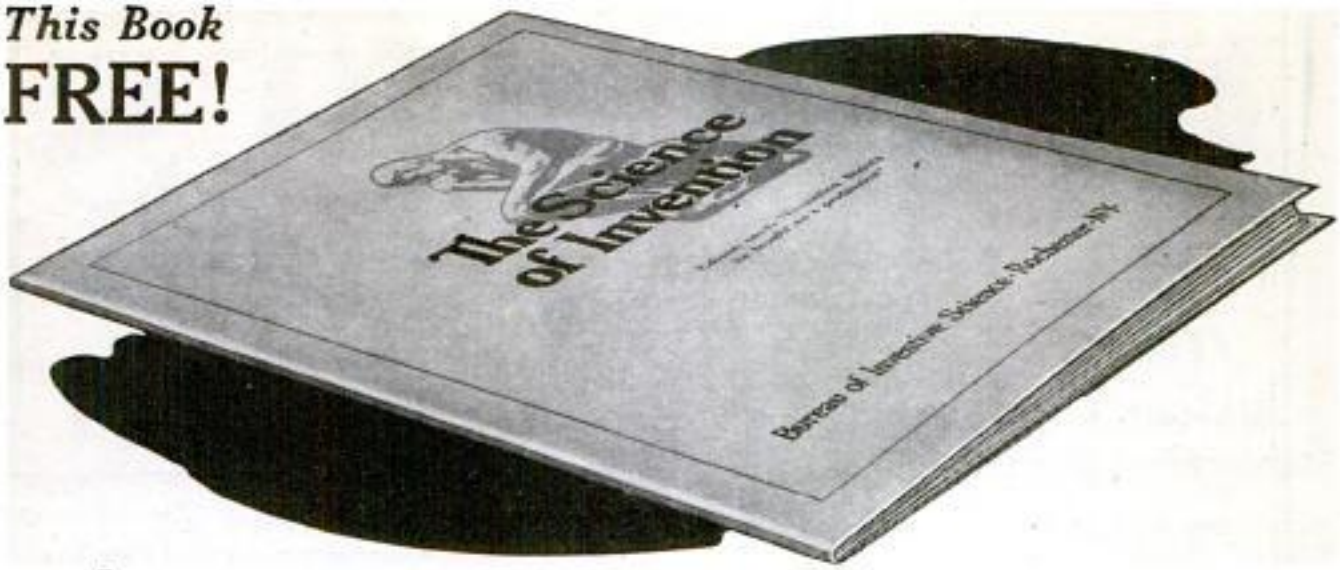

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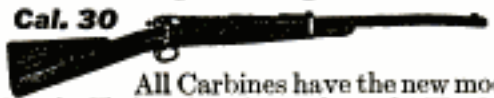

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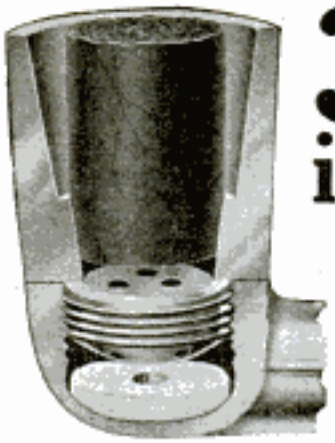

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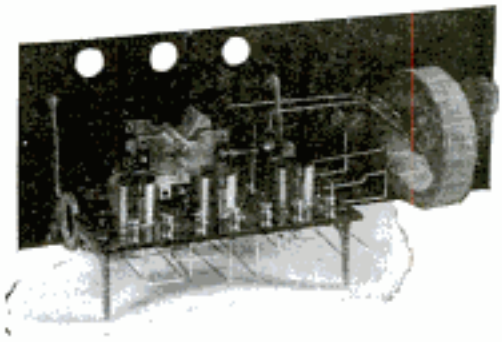

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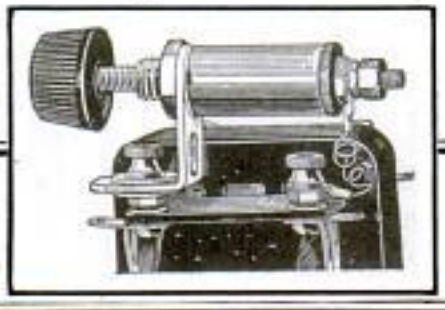

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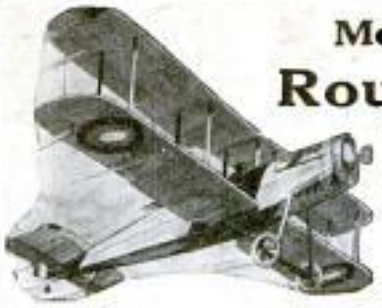

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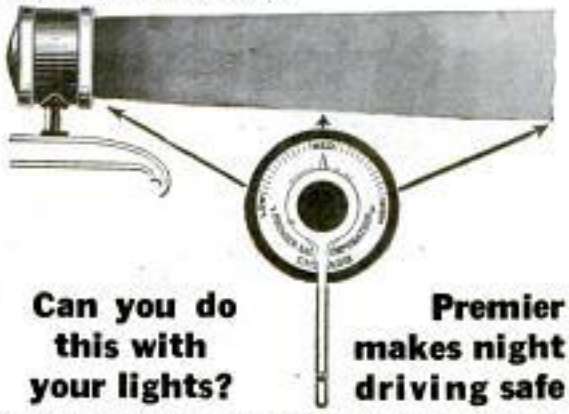
Please Mention Popular Mechanics

MARVELOUS! NEW! Headlite Control

The Premier Headlite Control makes it possible to adjust your headlights from dim to full bright—or any degree between—with a mere flick of the finger.



Can you do this with your lights?

Premier makes night driving safe

The self-starter made automobile driving a pleasure. This marvelous new Premier Headlite Control makes it safe. With the Premier Headlite Control there is no blind spot. Makes passing safe for approaching cars and gives you enough light on the road ahead, regardless of weather or conditions of the road. Equally effective for city or country driving. Can be attached to any car in 10 minutes.

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Quick Results

Trying to quit the tobacco habit unaided is often a losing fight against heavy odds, and may mean a serious shock to your nervous system. So don't try it! Make the tobacco habit quit you. It will quit you if you will just take **Tobacco Redeemer** according to directions.

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it. Whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—**Tobacco Redeemer** will positively remove all craving for tobacco in any form in a few days. Your tobacco craving will usually begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is marvelously quick, scientific and thoroughly reliable.

Not a Substitute

Tobacco Redeemer is in no sense a substitute for tobacco, but is a radical, efficient treatment. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It helps to quiet the nerves, and will make you feel better in every way. If you really want to quit the tobacco habit—get rid of it so completely that when you see others using it, it will not awaken the slightest desire in you—you should at once begin a course of **Tobacco Redeemer** treatment for the habit.

Results Absolutely Guaranteed

A single trial will convince the most skeptical. Our legal, binding, money-back guarantee goes with each full treatment. If **Tobacco Redeemer fails to banish the tobacco habit** when taken according to the plain and easy directions, your money will be cheerfully refunded upon demand.

Let Us Send You Convincing Proof

If you are a slave of the tobacco habit and want to find a sure, quick way of quitting "for keeps" you owe it to yourself and to your family to mail the coupon below or send your name and address on a postal and receive our free booklet on the deadly effect of tobacco on the human system, and positive proof that **Tobacco Redeemer** will quickly free you from the habit.

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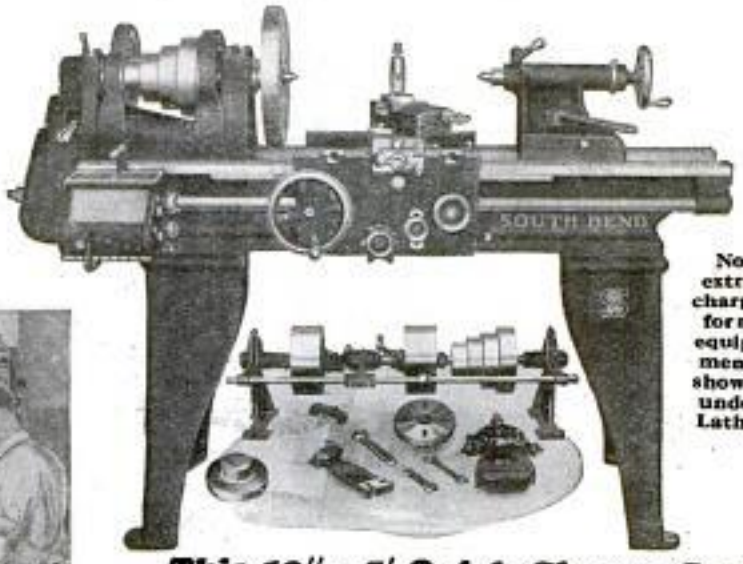

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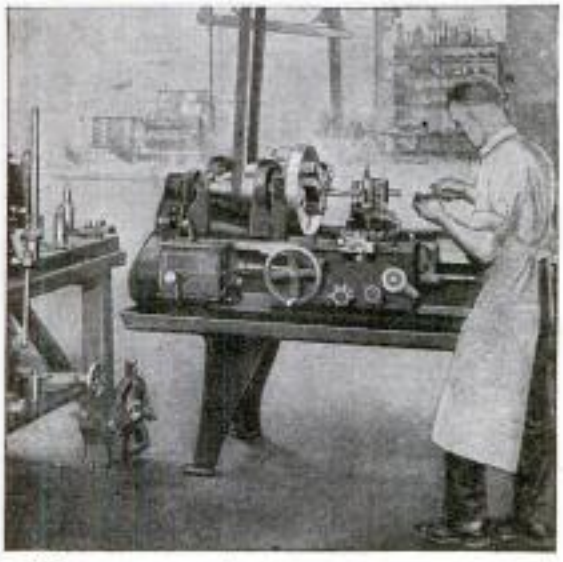

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$250.00 Weekly!

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Fred Ranson was tired of his job as traveling salesman for an Indiana grocery concern. One day he ran across a TATER-FLAKE store in a small Hoosier town. Ranson, knowing the universal appeal and splendid sales qualities of a food product, was interested. He bought a sack of TATER-FLAKES, tasted them, and was amazed at the delightful flavor. He found other TATER-FLAKE stands on his travels. Everywhere Ranson heard the same report—thriving business and making money. He even carried his investigations into Chicago, and before he left for home had bought a TATER-FLAKE machine. Today he is earning an average of $1000 a month—running around $250 weekly. Others, too—Berry, Bratton, Sullivan, Hoffman & McLeish and many more—have been equally successful. All are making money easily, rapidly and pleasantly. TATER-FLAKES offers an unusual opportunity—a chance for you to get into a thriving, dignified business. It's worth investigation. Write and get our proposition.

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New Invention—Just Out. Needed in every home every day. Patented. Nothing else like it. Low priced—**Sells on sight.** Sharpens any kitchen knife, paring knife, carving knife, bread knife, or shears and scissors **in ten seconds.** Mechanical masterpiece. A child can use it. Just put knife in slot—turn crank—sharpens both sides at once automatically. **We want representatives at once**—men and women hustlers. Get this position where **profits start first day.**

No Experience Necessary—200% Profit

Make as much money next week as these men are making now. J. C. Lewis, of Kansas, says: **"I have sold one hundred sharpeners in four days."** Hobart Kerr, of Md., writes: "The women can hardly wait till they get them." Herbert Cain, of Ky., sold nine after supper. At the end of the first day, J. W. Gordon, of Pa., writes: "I sold two dozen and **I sold to everyone I saw."** Wm. G. Hall, of N. J., says: "I think it is great. I sold six in about one-half hour. The machine is a mighty fine proposition. **I am a mechanic and I know what I am talking about." You can make this money. WRITE TODAY. TERRITORY FREE. Get busy at once.**

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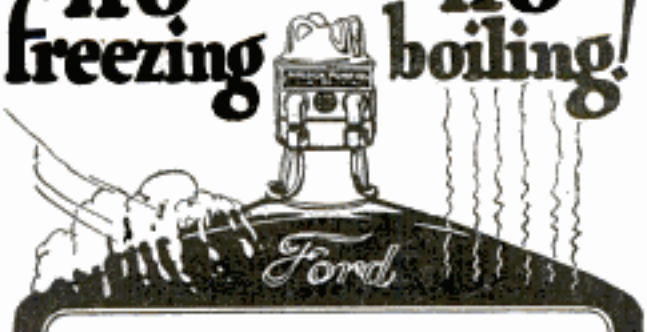
no freezing no boiling!



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When they shave with Barbasol. Saves time, looks better, feels like a million. No brush. No rub-in. You just try it—three times—according to directions. 35c and 65c tubes.

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Please mail me your Free Trial Tube of Barbasol.

Name.....

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P.M. 1-25

For Modern Shaving

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Astonish Your Friends

by learning to play a string instrument in 10 minutes! Play the latest music on the Ukulele, Banjo, Mandolin, or Guitar. Become popular. New pleasures. New money-making opportunities. Send at once for

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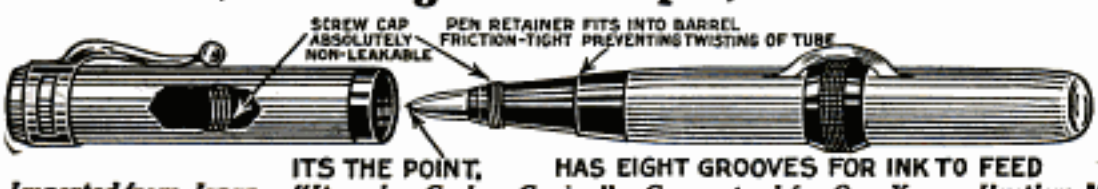

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Box contains 12 eggs. When lit with a match, each one gradually hatches itself into a snake several feet long, which curls and twists about in a most life-like manner.

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Roll your own and save money. Makes them better and quicker besides saving more than half. Use your favorite brand of tobacco. Neat, useful and handy. Pocket size, weighs ½ oz. Made entirely of metal, nickel-plated. **Price 25c postpaid.**

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I find that your claims for increased mileage are correct and that a big saving is made by your SUPER, in fact, the best device I have met with in that line.
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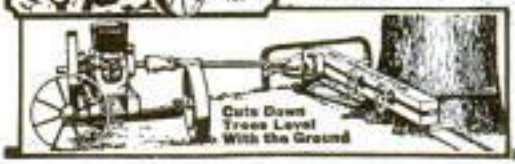

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The model shown is the "C" Melody Buescher Saxophone

The Life of the Party

When young folks get together, the first note of the Saxophone puts pep into the party. It's an irresistible joy-maker for all social occasions. It combines the ring ng notes of the cornet with the soft sweet tones of the reed instruments. With piano accompaniment, Why! it's almost like a full orchestra. The **ability to play a Saxophone lifts a young man out of the crowd, puts him in the social spotlight and develops his personality. He's the life of the party with his**

BUESCHER True Tone SAXOPHONE

You don't have to "study" the Saxophone as you do other instruments. There's no practice drudgery. Three lessons sent free start you. In a week you can play popular airs. It's great fun, and even though you're interested only for pleasure now, you can in 90 days, if you wish, join a band or orchestra. You might become a wizard like Tom Brown, Clyde Doerr or Ross Gorman. First class Saxophonists make big money.

Try It Out Free For Six Days In Your Own Home

Send the coupon or postal for a free copy of our very interesting Saxophone Book. Tells all about the various styles with pictures of the famous professionals and orchestras of America. Mention any other instrument in which you may be interested. No obligation. Do it today.

Buescher Band Instrument Co. 382 Buescher Block ELKHART, - - INDIANA

Free!

This beautiful book shows how easy it is to learn to play a Buescher. In it you will find the first lesson chart. It shows all the different models and tells what each is used for. Hundreds of pictures. 64 pages. You should have a copy of this very fine book.

Mail

Buescher Band Instrument Co., 382 Buescher Block, Elkhart, Indiana

Gentlemen: Without obligation to me send me your beautiful book "The Story of the Saxophone" as described above. Check here ☐

If you prefer literature describing some other band or orchestra instrument, check below.
Cornet ☐ Trumpet ☐ Trombone ☐ Tuba ☐
Mention Any Other.....

Write plainly, Name, Address, Town and State in margin below.

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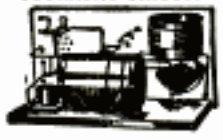
60,000 Barawik Sets Prove Our Reliability

We have many thousands of customers all over the world. You take no risk in dealing with us. We are one of the oldest and most reliable radio supply houses. Our guarantee protects you. Let us serve you and save money for you. All orders shipped same day received.

VALUE

COCKADAY CIRCUIT

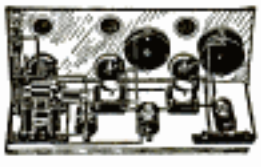


L873 Complete parts, 1 tube set **$10.25**
L874 Complete parts, 2 tube set **$6.75**
A very selective set that will tune out even nearby stations. A favorite circuit with many builders. One tube set has 7x14 panel, 2 tube 7x21. Panels are drilled for easy assembly. Instructions furnished for assembly.

IMPROVED COCKADAY CIRCUIT

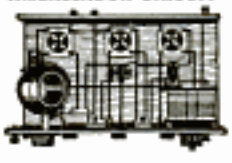
L875 Complete parts for 3 tube set **$48.85**
This is the latest model Cockaday circuit with resistance coupled amplifier. Green silk coil wound on bakelite tubing, highest grade grounded rotor low loss condenser and best grade parts throughout. 7x24 panel drilled ready to mount parts. Complete with instructions for assembling.

ERLA REFLEX CIRCUITS



L876 Complete parts, 1 tube set **$21.50**
L877 Complete parts, 2 tube set **$11.50**
L878 Complete parts, 3 tube set **$14.50**
These circuits have opened a new field in radio. One tube does the work of three in an ordinary set, two equal to four, three equal five. Crystal detector improves quality of reproduction, preserving the full mellow tones of the original. Easily handled, will bring in distance well. All parts are genuine Erla exactly as specified in Erla circuits. Panels are drilled for easy assembly. One tube set has 6x7 panel, two tube 7x14, three tube 7x18.

AMBASSADOR CIRCUIT



L881 Complete parts for 3 tube set **$20.95**
A three circuit set that is very selective and sensitive and brings in distant stations with excellent volume. Genuine Ambassador tuning coil wound throughout with Litz wire permits sharp tuning. Simple to build and operate. Genuine bakelite panel, size 7x18, drilled ready to mount parts. Complete with instructions for assembling.

PARTS FOR 5 TUBE HAZEELTINE NEUTRODYNE CIRCUIT

L858 Complete set parts, including mahogany finished cabinet... **$33.50**
All the parts needed to build this circuit which is the leader of all circuits today. Tunes through interference. Easy to find stations once they have been located. Brings in distant stations on the loud speaker in clear pure tones with wonderful volume. Essential parts licensed under Hazeltine patents. Genuine bakelite panel 7x24x3/16" drilled ready to mount parts. Complete instructions furnished for assembling and wiring. With these parts you can easily build a high grade set at low cost. Note that all our prices are prepaid.

LICENSED NEUTRODYNE PARTS

L852 Licensed Neutrodyne Kit... **$14.95**
Includes three licensed Neutroformers, 2 neutrodons, panel layout, template and book of instructions for building up neutrodyne set. By adding other parts a neutrodyne set can be built at low cost.

TUNED RADIO FREQUENCY UNIT

L853 Each..... **$2.75**
Three for..... **7.85**
Consists of radio frequency transformer wound on bakelite tubing and high grade variable condenser. For use in tuned radio frequency circuits. Usually used in sets of three. Condenser shaft ¼-inch diam.

BALANCING CONDENSERS

L854 Pair..... **75c**
Sold in pairs for neutralizing the capacity in two-stage radio frequency circuits.

$42.50 5 Tube Bargain

The greatest radio value ever offered

A five-tube radio frequency set that brings in the distant stations on the loud speaker. All the volume you could want with the finest tone quality, clear and sweet. Careful designing with big quantity production make our low price possible. Only the finest quality materials used throughout. New style efficient low loss condensers and transformers. Bakelite panel size 7x18 in. Handsome mahogany finish cabinet. Neat convenient dials. We can recommend this set for either city or country use. Will not reradiate and will bring in stations from coast to coast. No set approaches this for value. Equals many sets selling at double and triple our price. Try it for ten days. If you are not satisfied return it and we will refund your money.

L867 Set, only..... $42.50
L868 Set complete with five 201A tubes, 90 volts B battery, 100 ampere storage battery, one L613 Special Speaker, and complete antenna equipment. Nothing extra to buy. Price..... $82.00

PARTS FOR REINARTZ CIRCUIT

L862 Complete set of parts for one tube set..... **$16.75**
L863 Complete set of parts for three tube set..... **$37.95**
One of the best circuits for bringing in distant stations. Can be built at very low cost yet produces fine results. Easy to handle. The three tube provides loud speaker volume on distant stations. One tube set has 7x14 panel, 2 tube set 7x21 panel. Panels are drilled for easy assembly. Complete with instructions for assembling.

CABINETS

Fine looking cabinets solidly built. Elegant hand rubbed dark mahogany finish. You will be proud of your set mounted in one of these cabinets. Hinged tops. Panel fits flush in front recess. Panels not included. Inside depth 7 inches except 9x14, 12x14, 12x21, which are 10 in. deep. Prices quoted are prepaid and are the lowest ever offered on quality cabinets.

Panel Size	Art. No.	Price Each	Panel Size	Art. No.	Price Each
6x7"	L420	$1.95	7x21"	L425	$3.25
6x10¼"	L422	2.45	7x24"	L429	3.48
7x10"	L423	2.60	7x30"	L431	3.98
7x12"	L424	2.85	9x14"	L430	3.95
7x14"	L433	2.95	12x14"	L436	4.85
7x18"	L426	3.45	12x21"	L432	5.85

BASE BOARDS FOR CABINETS

Fasten to bottom of panel and fit inside cabinets. ¾ inch thick, 6½ inches wide.

Art. No.	Length Inches	Price Each	Art. No.	Length Inches	Price Each
L435	6½	19c	L439	17½	23c
L436	9½	23c	L440	20½	32c
			L441	23½	33c
L437	11¾	25c	L442	25½	39c
L438	13¾	27c			

DE LUXE CABINET

The finest quality cabinet. A piece of furniture worthy of the best set. Made of genuine solid walnut in elegant hand rubbed natural walnut or brown mahogany finish. State which is wanted. Top has piano hinge and lid support. Foot at base add to striking appearance. Inside d.:p h 9 inches.

Panel Size	Art. No.	Price Each	Panel Size	Art. No.	Price Each
7x18	L444	$7.45	7x26	L447	$10.50
7x21	L445	8.25	7x28	L449	11.50
7x24	L446	8.95	7x36	L448	13.75

CONSOLE RADIO CABINET

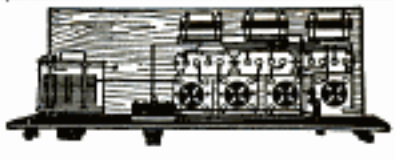
L902 Prepaid price, as **$37.50**
A high grade piece of furniture. Neat appearance. Elegant finish. Looks well among finest furnishings. Top compartment takes any set or panel size 6 in. high, 10 in. deep, 32 in. long or smaller. Lower compartments hold batteries, chargers and all accessories. Can be entirely closed and locked. Strong durable construction. Panaled doors. Fine mahogany or walnut finish. Size over all, 37 in. wide, 14 in. deep, 42 in. high.

PARTS FOR 5 TUBE PHUSIFORMER CIRCUIT

L889 Complete set of parts, including high grade cabinet **$15.95**
One of the easiest sets to build. Best results assured. Two stages tuned radio frequency amplification detector and two stages audio amplification. Brings in the distant stations with great volume and purest tones. Best grade parts furnished throughout. Genuine bakelite panel 7x26x3/16" drilled ready to mount parts. Complete instructions furnished for wiring and assembling. Note that all our prices are transportation prepaid.

ACME REFLEX CIRCUIT

L885 Complete parts for 4 tube set..... **$44.50**
One of the most efficient circuits known. Combines three stages of radio frequency and audio frequency using only four tubes. Crystal detector gives unusual clarity. Genuine Acme condenser, Pot Rheo, radio and audio frequency transformers supplied. Genuine bakelite panel, size 7x21, drilled ready to mount parts. Complete with instructions for assembling.



SPIDER WEB COIL FOR REINARTZ CIRCUIT

L296 Each..... **$1.05**
A very unusual value. Made of green silk covered wire, spiderweb wound. 21 taps so arranged that crossing avoided. Mounting bracket permits various styles of mounting. Directions included.

COCKADAY PARTS

L295 Per set..... **$1.45**
Complete set coils for Cockaday circuit. Properly calculated and made to give best results in this new wonder circuit.

L276 Amplex grid-denser for Cockaday Improved 3 tube circuit..... **$1.10**

LARGE CAPACITY FIXED CONDENSERS

Tested for use in the new radio circuits. Metal cases. Soldering lugs for connections. Best materials. Carefully made.

L358 .25 mfd. **55c** **L359** .5 mfd. **$ .65**
L360 1. mfd. **85c** **L361** 2. mfd. **1.35**

MURDOCK FIVE TUBE NEUTRODYNE SET

L879 Complete with tubes, batteries and accessories as listed below..... **$250.50**
A high grade, genuine five tube Neutrodyne set at an unusually attractive price. Manufactured under the Hazeltine patents. Engraved panel and finely finished solid mahogany cabinet lend richness and dignity to its appearance. Easy to tune. When station has been heard once and record made of dial setting you need only set dials at same point and if station is broadcasting it will be heard. Brings in distant stations loud and clear on loud speaker. Our price, which is transportation prepaid, includes the following: Set in cabinet, five C301A or UV-201A tubes, 100 ampere hour storage "A" battery, two 45 volt "B" batteries, one Magnavox M4 loud speaker and complete antenna equipment consisting of wire, insulators, lightning arresters, etc.

PHUSIFORMER

L546 Each..... **$6.85**
A new device especially designed for tuned radio frequency circuits. Consists of primary and secondary inductively coupled coils connected with variable condenser, all enclosed in moulded case with binding posts. Dial on shaft of condenser. Size 4½ in. square, 2 in. thick. Three units occupy small space and can be used to make up a very efficient 5 tube set at low cost.

COILS FOR HARKNESS CIRCUIT

L295 Per set of two **$1.95**
Green silk windings on genuine bakelite tubes. Properly calculated to give best results.

L879 Complete parts for 2 Tube Harkness Reflex Set with panel drilled for mounting parts and instructions for assembling **$15.85**

The Barawik Co.

102 So. Canal St. Chicago, Ill.

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Prices Now are Lower than Ever Before

WE PAY TRANSPORTATION CHARGES IN U. S. EAST OF THE ROCKIES
THE PRICES QUOTED DELIVER THE GOODS TO YOUR DOOR
ALL ORDERS SHIPPED SAME DAY RECEIVED

THIS GUARANTEE PROTECTS YOU—Examine the goods we ship you. They must suit you in every respect. If you are not satisfied with your purchase return the goods at once and we will refund the price you paid

QUALITY

STORAGE "A" BATTERY

The best battery buy on the market. Guaranteed for three years. Made of best new materials. Full capacity. Try one of these batteries for 10 days. If at the end of that time you are not fully satisfied return it and we will refund the purchase price. Note our prices are prepaid. Transportation cost considered, these are the lowest prices obtainable. We deliver this high quality battery to you for less than the cost of inferior batteries.

L194 6 volt, 60 amp. size. Each..$9.90
L196 6 volt, 100 amp. size. Each..$13.25

BATTERY CHARGER

Connect charger to 110 volt 60 cycle light socket and your battery charges automatically over night at a cost of only a few cents. Cord and clips for connections included.

L301 For 6 volt battery.....$12.95
L303 For 12 volt battery.....$2.95

Noiseless Rectifier Bulb Charger—King, Tungar or Rectigon.
L255 2 amp. $14.95 L256 5 amp. $24.95
Extra Bulbs
L257 2 amp. $3.60 L258 5 amp. $7.40

HYDROMETER

L190 Each.....48c
Helps keep battery in better shape by showing exact condition.

BATTERY CLIPS

L198 Two for.....28c
Clip onto storage battery terminals, lead coated. Make positive non-corrosive contact at all times.

"A" BATTERY CORDS

L191 Per pair.....69c
Two heavy insulated stranded copper wires 5 feet long. Battery clip on one end and binding post terminal on other end. Eliminate shorting of "A" battery. Provide positive connections.

CONNECTING CORD SET

L192 Each.....32c
Five connecting cords with braid over all. Each cord has distinctive colored covering. Terminals for connections. Makes connecting of both A and B batteries to set easy with no mistakes in polarity or voltage. Will reach from table to floor or for use in any type cabinet. Does away with unsightly wires. This is a $1.00 retail value.

PLATE CIRCUIT "B" BATTERIES

Reduced prices. A leading standard brand advertised to sell at much higher prices. No better battery made. Longest service.

L189 Small size 2 by 2½ by 3⅝ inches. 22½ volts. Each.....95c
Ten for.....$8.60
L184 Large size, 5 taps. Size 3x4x6¼" 22½ volts. Each..$1.65 Ten for $14.75
L188 Large size, 6 taps. Size 3x8x6¼" 45 volts. Each $2.90 Ten for $27.90

L181 22½ volt. New upright size 3x2½x5¼ in. Takes less space in set. Each.....$1.90
L183 45 volt upright, size 3x7x 8 in. Each $2.98. Ten for $27.90

"C" BATTERY

L186 4½ volt C battery size 4x 1¾x3". Ea. 42c Ten for $3.95

STORAGE "B" BATTERIES

L202 12 cells, 24 volts. Each.....$3.95
More economical than dry cell "B" batteries on sets using 3 or more tubes. Can be recharged when run down. Capacity 2500 milliamperes. A high grade battery. Glass jars with rubber caps. Strong moulded tray. Shipped dry so as to be available. No Electrolyte included.

"B" BATTERY CHARGER

L205 Each.....$8.95
Recharges 24 or 48 volt B batteries from 110 volt 60 cycle light socket rapidly and at practically no cost. Keeps batteries in good condition.

BATTERY METERS

L189 Each.....82c
Reads 0 to 50 volts. Accurately tells you condition of "B" Battery. Convenient watch size. Tests 22½ and 45 volt batteries.
L193 Combination meter.....$1.39
Reads 0-60 volts; 0 to 35 amperes. Tests "B" and "A" dry cells.

PHONOGRAPH ADAPTERS

L771 Fits single unit ½ tone arm. Each.....39c
L773 Fits any double headset to tone arm. Each 65c
Convert your phonograph into a loud speaker. Take off the reproducer and replace with adapter and unit or headset. Such a combination will equal or surpass in tone and volume many high priced speakers.

SUPERIOR RADIO PLUGS

Both styles take two sets of cord tips. Polished round barrels.
L397 With turned fibre barrel. Highest grade obtainable. Each.....44c
L395 With black moulded composition barrel. Wonderful value. Each.....25c

NEW STYLE PLUG

L401 Each.....89c
Cords are held firmly in place but can be detached instantly without taking plug apart. No screws to loosen. Bakelite body. Fits all standard jacks. Best plug made.

LOUD SPEAKER UNITS WITH PHONOGRAPH ATTACHMENTS

Make a loud speaker of your phonograph. These attachments consist of a high grade speaker unit arranged to attach to tone arm of phonograph in place of a reproducer. Fit Victor, Bamora, Silvertone and other phonographs having same size tone arm.
L662 Baldwin.....$7.45
L687 Western Electric.....8.55

EXTENSION CORDS

L403 30 ft.....$1.95
Place loud speaker wherever desired without moving set. Consists of high grade receiver cord of length specified with plug on one end and jack on other to take plug on loud speaker cord.

PHONE CUSHIONS

L774 Pair.....43c
Made of soft sponge rubber. Light as a feather. Fit any phones. Exclude all noises and make wearing phones a pleasure.

L613 Special Sale Price.....$5.95

This speaker is a marvel for volume and quality of tone. It is actually superior to most of the higher priced speakers and at our price is the biggest value on the market. Guaranteed to please you. Beautiful mottled black finished fiber horn. Bell diameter 10 inches. Height 21 inches. Complete with cord.

BARAWIK QUALITY HEADSET

L778 Spec. Price per set $2.28
These headsets are the very best for tone quality and volume. Finest quality. Designed to sell for much higher prices than we ask and at our price are a wonderful bargain. Receiver cases are fine polished black finish. Comfortable fabric covered head band. Complete with 5 foot cord.

CABINET TYPE LOUD SPEAKER

L685 Prepaid price, each.....$12.50
A fine loud speaker with a full rich tone and unusual volume. Amplifying chamber and unit enclosed in fine mahogany finished cabinet with silk backed grille front. Very convenient and better looking than most other types of speakers. A wonderful value at our price, in our opinion equal to other speakers sold at double our price.

STANDARD BRAND LOUD SPEAKERS AND UNITS

L618 Brandes Table Talker.....$7.85
L616 Atlas Loud Speaker.....21.50
L620 Baldwin Loud Speaker.....22.50
L603 Magnavox M4 Loud Speaker 21.00
L632 Magnavox R3 Loud Speaker 29.50
L614 Magnavox M1 Loud Speaker 26.50
L757 Morrison Adjustable Unit.....4.45
L755 Genuine Baldwin Type C unit 4.75
L606 Atlas Unit. Each.....10.75

RADIO SOLDERING IRON

L640...50c
This guaranteed iron is exactly right for radio work. A neat solid connection quickly and easily made. Operates on any lighting current 100 to 120 volts. 6 ft. cord with attaching plug. Length 13 in.

HEXAGON NUT WRENCHES

L650 Set of 3...69c
Handiest tool made for tightening hexagon nuts. Fit nuts for 4-36, 6-32, and 8-32 screws, the three most popular radio sizes.

STANDARD BRAND HEADSETS

L754 Baldwin Type C.....$5.95
L764 Frost, 2000 ohm.....3.20
L766 Frost, 3000 ohm.....3.95
L751 Murdock 56, 2000 ohm.....3.25
L752 Murdock 56, 3000 ohm.....3.90
L788 Brandes Superior, 2000 ohm..4.45
L769 Brandes Navy, 3000 ohm.....6.85

MULTIPLE PLUG

L402 Each.....89c
Attach any number of headsets up to four. Cords attached or detached instantly without taking plug apart.

LONG BLADE SCREWDRIVERS

L647 6 inch...20c
L648 8 inch...25c
L649 10 inch.....30c
Long narrow blade makes it easier to get in difficult places. Wood handle. Length given is over all.

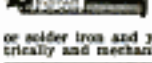
LONG NOSE PLIERS

L676 Each.....83c
The handiest pliers for radio work. Made of fine hardened steel. Length 5 inches.

DIAGONAL JAW NIPPERS

L672 Each.....75c
For fine electrical work, made of hardened steel. Cuts wire clean in tight places. Length 5 inches.

TINOL



L969 Per tube..19c
A combined solder and flux in handy form. Put a little on the connection, heat with a match, torch or solder iron and you have a neat electrically and mechanically perfect joint.

ROSIN CORE SOLDER

L973 4 ounces.....20c

All Orders Shipped Same Day Received

LIGHT SOCKET ANTENNA

L976 Each.....97c
Screws into any light socket. Replaces the regular out door antenna. Very satisfactory for nearby stations and under favorable conditions will bring in distant stations. Easy to install. No danger. Gives clear reception with little static interference. Ideal for people in apartment buildings.

FANNESTOCK CONNECTORS

L366 Single Connector. Dozen 14c
L367 Double Connector. Dozen.....18c
L968 Antenna Connector. Each...8c

ANTENNA MAST FITTINGS

L952 For ½ inch pipe.
Per set.....$1.80
L953 For 1 inch pipe.
Per set.....$2.85
Set includes adjustable base to fit roof peak or flat surface, center guy wire fastening ring and top cap with pulley for rope to raise and lower antenna. No pipe included. Makes the installation of a first class antenna simple and inexpensive.

ANTENNA OUTFIT

L372 Each.....$2.78
Consists of 150 feet stranded copper antenna cable, lightning arrester, four wall insulators, two antenna insulators, antenna lead-in, 25 feet insulated ground wire, ground clamp and 25 feet connecting wire.

STRANDED ANTENNA WIRE

Cabled of fine copper strands. Very flexible. High tensile strength. Best for aerials.
L248 100 ft. coil.....45c
L249 300 ft. coil.....$2.35

SOLID BARE COPPER WIRE

Solid bare copper wire for aerials, leads or wiring instruments. Size 14.
L240 100 ft. coil.....42c
L242 300 ft. coil.....$2.85

GROUND CLAMP

L273 Made of soft copper ¾" wide with Fahnestock connector. Fits any pipe ½ to 1 inch wide. Each.....8c

ANTENNA INSULATORS

L262 Ribbed Porcelain Insulator, 2½ in. long. Ea. 6c
Dozen.....55c
L265 Ribbed Porcelain Insulator—5 inches long. Ea. 15c

L268

ANTENNA LEAD-IN

L259.....15c
Antenna wire is brought in without drilling a hole. Place on window sill and window can be closed down tight and locked as before. Well insulated. Can be bent into any shape. Made of copper strip properly insulated.

WALL MOUNTING INSULATOR

L262 Each 7c
Dozen.....65c
Galvanized screw mounting. Lead-in wire passes through center of porcelain insulator and is kept away from possible grounds. Easily installed.

PORCELAIN BASE SWITCHES

Fine white porcelain bases. Copper contacts and blades. Can be used as antenna switches.
L383 Single Pole Single Throw. Ea. 18c
L383 Single Pole Double Throw. Ea. 25c
L384 Double Pole Double Throw. Ea. 45c

OUTDOOR ARRESTER

L980.....$1.24
Protect your instruments with this lightning arrester. Weatherproof Bakelite case. Underwriters approved.

JEWELL LIGHTNING ARRESTER

L981 Each.....68c
A dependable protector, always on guard. Small and compact. Weatherproof porcelain case. Easily fastened and connected. Underwriters approved.

SUPERIOR LIGHTNING ARRESTER

L982 Each.....39c
Porcelain block with brass binding posts. Dependable and effective.

COLLAPSIBLE LOOP ANTENNA

L976 Each.....$3.80
A full size loop antenna 21 in. high, 28 in. wide. Folds into compact case 18 in. long, 3 in. diam. Well made. Fine looking. Insulated wire, extra flexible. Suitable for use with any loop set. Case included. Quickly set up or taken down.

The Barawik Co.
102 So. Canal St., Chicago, Ill.

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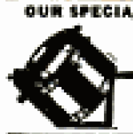
BARAWIK — QUALITY

It is Easy to Build·Your Own Radio Set

WE PAY TRANSPORTATION CHARGES IN U. S. EAST OF THE ROCKIES
THE PRICES QUOTED DELIVER THE GOODS TO YOUR DOOR
ALL ORDERS SHIPPED SAME DAY RECEIVED

HOW TO ORDER—Write your Order plainly, state Article Number, Description and Price of Items wanted. Send Postoffice or Express Money Order, Certified Check or Bank Draft for Total of Order. Prompt Shipment is assured when these directions are followed.

OUR SPECIAL VARIOCOUPLER

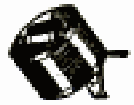


L418 Each .... $1.88 The most efficient type of coupler. Primary and secondary wound on bakelite tubes. Primary tapped for fine tuning. 3-16 inch shaft. Range 150 to 650 meters.

MOULDED VARIOMETER

L452 Each ... $2.38 Polished black moulded rotor and stator forms. Maximum inductance with greatest efficiency and minimum distributed capacity. A high grade instrument that will get the best results. Wave length 180 to 600 meters.

EXCEL 180° VARIOCOUPLER

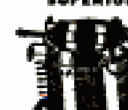


L521 Each .... 98c A wonderful value. Produces excellent results. Green silk windings. Rigid mounting support. Primary tapped for fine tuning. ¼ inch shaft. Range 200-600 Meters.
L522 Variometer—same style. Each 98c

SUPERIOR BAKELITE VARIOMETER

L525 Each ..... $3.35 Forms moulded of red bakelite. A neat handsome instrument. Green silk windings calculated for highest efficiency. ¼ inch shaft. Noiseless pigtail connections. Produces superior results in any type circuit 180 to 600 meters.
L537 Variocoupler. Same style. Primary tapped for fine tuning. Each $3.88

SUPERIOR VARIOCOUPLER



L533 Each ... $3.35 Stator tube and rotor ball of moulded red brown bakelite. Large size green silk windings insure highest efficiency. ¼ inch shaft. Superior results in circuits for 180 to 630 meters. Tapped primary for finest tuning. Noiseless contacts.
L536 Special type for single circuit Regenerative Hook up. Each $3.75

SPLIT STATOR VARIOMETER

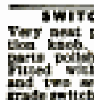
L524 Each ... $3.88 A wonderful value at our price. Polished black bakelite rotor and stator forms. Large size green silk wire insures greatest efficiency. ¼ inch shaft. Noiseless pigtail connection. Split stator winding.

PFANSTIEHL SPIDER WEB VARIOMETER AND VARIOCOUPLER

L486 Variometer. Ea. $3.95
L487 Variocoupler. Ea. 4.25
Sharp tuning, high efficiency and responsiveness to distant signals are features of these instruments due to absence of any insulating material in the magnetic field. Low energy loss. Secondary adjustment provides sharp tuning. Panel or table mounting. Complete with dial.

COTO COMPACT VARIOMETER, AND VARIOCOUPLER

L488 Variometer. Ea... $4.18
L489 Variocoupler. Ea. 4.35
Small in size. Highly efficient. Unequaled for portable sets. Variometer measures 3½ x 1¾x3¾ inches. Variocoupler 2¾x3x3¾. Moulded bakelite forms. Silk covered windings. Table or panel mounting. ¼ inch shafts. Range 200 to 600 meters.



SWITCH LEVERS

Very neat polished composition knob. Exposed metal parts polished nickel finish. Fitted with panel bushing and two set nuts. A high grade switch. 1¼ inch radius.
L281 With black knob. Ea. 14c
L282 With mahogany knob. Each .18c

INDUCTANCE SWITCH

L285 Price including knob and dial .... $1.28 Mounts switch points and contact lever behind panel. Only one hole needed to mount. 12 switch points, any number of which may be used.

SPIDER WEB COILS

L290— 25 turn 39c L292—50 turn 47c
L291— 35 turn 42c L293—75 turn 54c
L294—100 turn. Each 68c
A new popular type of inductance of highest efficiency. Lowest distributed capacity and lowest high frequency resistance. Firm green silk windings with mounting strips.

SUPERIOR RADIO JACKS

Finest grade jacks. Improved design. Best materials. Phosphor bronze springs. Silver contact points. Nickel finish. Mount on panels ⅛ to ⅜ in.

L390 Open circuit. Each .... .32c
L391 Closed circuit. Each .... .39c
L392 Two circuit. Each .... .49c
L393 Single circuit filament control .. .46c
L394 Two circuit filament control .. .59c

RADIO SWITCH

L287 Each .... .28c Cuts current on and off instantly by a push or pull. Very neat. Well made. Durable. Saves tubes and batteries.

SUPERIOR RADIO SWITCH

L283 Each .... 28c A switch fully equal to any on the market at a price about half what is usually asked for a switch of anywhere near equal quality.

NEW STYLE JACKS

L379 Single circuit. Each 34c
L380 Double circuit. Each 45c
Occupy less space than other jacks. Binding posts, soldering unnecessary. Well made, durable, smooth working. Well insulated.

CORD TIP JACKS

L389 Pair .... 29c Eliminates expensive jacks and plugs. Mount on panel and insert headset or loud speaker cord tips. Nickel finish.

JACK SWITCHES

L280 Two springs. Usually used as "A" battery switch. Each 47c
L281 Three springs. For switching from long to short wave, from one battery to another, etc. Each 55c

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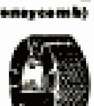
INDUCTANCE COILS (Honeycomb)



Carefully made—fine looking coils. Low resistance—high self inductance. Very firm impregnation. Mounted coils have standard plug mountings. Specify when ordering whether mounted or unmounted type is wanted.

Tns	Art No.	Not Mtd	Mtd	Tns	Art No.	Not Mtd	Mtd
25	L381	$.28	$.75	250	L387	1.08	$1.29
35	L382	.30	.90	300	L311	1.06	1.57
50	L383	.32	.95	1000	L314	1.64	2.18
75	L384	.37	1.03	1250	L315	1.86	2.35
100	L385	.52	1.07	1500	L316	2.18	2.39

INDUCTANCE COIL MOUNTINGS

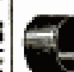
L340 3 Coil $2.75 L341 2 Coil $2.35 Made of polished black bakelite. Mount on front of panel.
L342 Mounts back of panel, with knobs or dials on front of panel. Takes 3 coils of any size. Each $3.25

MAGNET WIRE

Prices quoted are for 8 oz. spools unless otherwise stated. Prices are prepaid.

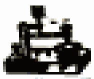
Double Cotton White L390	Enameled L392	Wire Size	Single Silk Green L391	Double Silk Green L393
38c	35c	18	54c	75c
42c	35c	20	60c	82c
45c	39c	22	70c	95c
52c	45c	24	83c	$1.05
75c	58c	26	95c	1.38
95c	58c	28	$1.15	1.68
$1.15	68c	30	4 oz. .88	4 oz. 1.18
1.49	65c	32	4 oz. .95	4 oz. 1.38
	88c	36	4 oz. 1.35	4 oz. 2.68

BAKELITE TUBING



Genuine bakelite tubing. Pieces 3 inches long only.
L985 Inside dia. 2½ in. 29c
L986 Inside dia. 3 in. .. 35c
L987 Inside dia. 3½ in. 38c
L988 Inside dia. 4 in. .. 43c

GALENA DETECTOR



Easy fine adjustment. Crystal mounted in cup. Moulded base and knob. Brass parts polished nickel finish.
L732 Each 59c

FRESHMAN DETECTOR

L750 Each .... $1.18 A double adjustable crystal detector especially suitable for reflex and other sets requiring a high grade detector. For front or back of panel mounting.

DETECTOR CRYSTALS

L730 Galena, Arlington tested, piece 15c
L728 Silicon, Arlington tested, piece 15c
L735 Tested Galena, Mounted, piece 9c
L737 Tested Silicon, per piece 9c
L760 Dutee Crystal. Each .... .27c

STANDARD BRAND FIXED CRYSTAL DETECTORS

The latest developments in Crystal Detectors. Used in Reflex circuits.
L742 Grewol Detector. Each $1.18
L747 RW Detector 1.18
L749 Brownlie Detector 1.75
L750 Brownlie Renewal .... .85

DUBILIER MICADON TYPE 601

L502 .0001	28c	L507 .0025	32c
L503 .00025	28c	L508 .002	48c
L504 .0005	28c	L509 .004	48c
L505 .001	32c	L510 .005	48c
L506 .002	32c	L511 .006	67c

DUBILIER MICADON 601G

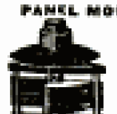
Same style condenser as above with mounting for tubular grid leak. No grid leak included.
L881 .00025. Each 36c
L882 .0005. Each 36c

DUBILIER MICADON 601T

Consists of a Type 601 condenser with brackets designed to fit over terminals on audio frequency transformers. Binding posts, etc.
L883 .001 mfd. 48c
L884 .002 mfd. 48c L885 .0025 mfd. 48c

The Barawik Co.
102 So. Canal St. Chicago, Ill.

PANEL MOUNTING VARIABLE CONDENSERS



These are especially high grade condensers and we guarantee them to be mechanically and electrically perfect. Fine polished end plates of heavy bakelite. Shafts ¼ inch diameter. Sturdy, heavy aluminum alloy plates perfectly spaced to insure smooth, even reliable capacity. Dial and knob on vernier type. No dial on plain type. Our low prices save you money.

No. Plates	Max. Cap.	Plain Type No.	Plain Type Price	Vernier Type No.	Vernier Type Price
3		L835	$.58		
5		L836	.97		
11	.00025	L834	1.15	L825	$1.95
17	.00035	L837	1.26		
23	.0005	L833	1.27	L824	2.19
43	.001	L832	1.49	L826	2.45

LOW LOSS VARIABLE CONDENSERS

The latest type condensers. Reduce current losses increasing efficiency of set. Heavy aluminum plates. Vernier type has single vernier plate controlled by lever. ¼ inch shaft. 3 inch dial required for vernier type.

No. Plates	Max. Cap.	Plain Type No.	Plain Type Price	Vernier Type No.	Vernier Type Price
11	.00025	L836	$1.98	L833	$2.18
23	.0005	L837	2.12	L834	2.36
43	.001	L838	2.96	L835	3.85

GROUNDED ROTOR LOW LOSS VARIABLE CONDENSERS

L797 .0003 .... $2.74
L798 .0005 .... 3.38
L799 .001 .... 3.98
The most efficient type condenser made. Low losses, grounded rotor, straight wave line. Made of the best grade materials throughout. Heavy aluminum plates. Well insulated.

STANDARD BRAND VARIABLE CONDENSERS

L810 Acme .0005 Vernier $5.65
L784 Coto .00025 Vernier 7.98
L785 Coto .0005 Vernier 4.38
L786 Coto .001 Vernier 4.98
L820 Remler .00025 .... 4.45
L821 Remler .0005 .... 4.45
L787 Cardwell .00025 .... 3.95
L788 Cardwell .00035 .... 4.35
L789 Cardwell .0005 .... 4.68
L790 Cardwell .001 .... 5.85
L791 Marco .00025 .... 3.85
L792 Marco .00035 .... 4.45
L793 Marco .0005 .... 4.85
L794 Marco .001 .... 5.85
L795 Flewelling .00025 Vernier 4.98
L796 Flewelling .0005 Vernier 4.98

FRESHMAN VARIABLE GRID LEAKS

L177 Back of panel style 47c
L178 Back of panel style with .00025 Condenser 69c
L171 Base mounting type with .00025 Condenser 69c

C R L VARIABLE GRID LEAK

L173 Without condenser but arranged to take any standard grid condenser $1.08
L175 With .00025 condenser 1.35
Turning knob varies resistance from ¼ to 5 megohms.

BRADLEY LEAK

Latest improved type.
L168 Without condenser. Resistance ¼ to 10 megohms $1.74
L169 With .00025 condenser 1.95

TUBULAR GRID LEAKS AND CONDENSERS

Cut shows leak or condenser mounted, but all parts are priced separately.
L849 Grid leaks (can be used with Dubilier 601G condensers) 18c
Resistances ¼, 1, 1½, 2, 3, 5, 7 and 10 megohms. Specify resistance.
L831 Grid and Plate Condensers. Ea. 28c Capacities .000025, .0001, .00025, .0005. Specify capacity.

Mountings—Bakelite Base
L840 Single. Each 15c
L842 Double. Each 27c
L844 Triple. Each 39c

TINNED COPPER "BUS BAR" WIRE

Size 14 tinned copper wire. For wiring sets. Best size for neat job and easy soldering.
L957 Round. Ten feet for 18c
L958 Square. Ten feet for 22c

SPAGHETTI

For covering connecting wires in sets. For size 12 and 14 wires.
L955 Finest quality braided and saturated with best baked lustrous transparent insulating varnish. 3 feet for 14c
L956 Best quality braid and covered with black insulating compound. 3 feet for 8c

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BARAWIK

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SERVICE

We have many thousands of customers all over the world. You take no risk in dealing with us. We are one of the oldest and most reliable radio supply houses. Our guarantee protects you. Let us serve you and save money for you. All orders shipped same day received.

VACUUM TUBES

Standard Brands—Cunningham, Radiotron. Every one guaranteed new and perfect and in original carton. We will ship brand in stock unless you specify otherwise.
L285 Detector, UV200, C300. Each....$2.59
L232 Amplifier, UV201A, C301A. Each....3.59
L238 5-Watt Transmitter....7.70
L297 WD11, C11. Each 3.59
L301 WD12, C12. Each 3.59
L302 UV199, C299. Each 3.59

ADAPTERS

To use dry cell tubes in standard base sockets simply insert one of these adapters in the socket.
L384 For 199 or 299 tubes..35c
L385 For WD11 or C11 tubes 35c

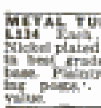
BAKELITE SOCKET

L140 Standard base. 32c
L141 UV199 base...27c
L136 C11..........27c
Moulded of genuine red brown bakelite. Binding post connections. Strong contacts. Real values.

EXTRA STRONG SOCKET

L142 Standard Base....38c
L138 C299 Base.......38c
Extra heavy. Square base. Double reinforced contact springs. For standard base tubes. A wonderful value.

PANEL MOUNT SOCKET

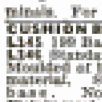


L143 Single Gang. $.42
L144 Three Gang... 1.25
The best socket value obtainable anywhere. Extra heavy moulded genuine brown bakelite. Double reinforced contact springs. Will mount on panel behind rheostat. Standard base.

METAL TUBE SOCKET

L134 Each..........25c
Nickel plated brass tube set in best grade composition base. Plainly marked binding posts. An excellent value.

STANDARD TUBE SOCKET



L150 Single Gang $.76
L155 Three Gang 2.25
Bakelite base. Polished nickeled tube. Highest quality socket on the market. Best insulation. Positive contact. Marked terminals. For base or panel mounting.

CUSHION BASE SOCKET

L145 199 Base.........59c
L146 Standard Base....75c
Moulded of high insulating material. Sponge rubber base. Nonmicrophonic. Plainly marked binding post connections. Neat and compact.

BINDING POSTS

Brass, polished nickel finish. Washer and 6-32 in. screw extending ⅜ in.

L370 Large size—barrel and knob ⅜ in. long. Dozen 70c
L372 Smaller size barrel and knob 9-16" long. Dz.........50c

L376 Large size with hole for phone tip or wire. Dozen.....80c
L378 Small size with hole for phone tip or wire. Dozen..........35c

LETTERED BINDING POSTS

L375 Set of eight.....38c
Nickel plated washers. Composition tops lettered as shown in illustration. Eliminate engraving. Improve appearance. Sold in sets of eight only.

COMPOSITION TOP BINDING POSTS

L374 Dozen 45c Hundred $3.00
Composition top, nickel plated body. 6-32 screw with washer.

SWITCH CONTACT POINTS

Brass, polished nickel finish. Have ¼ in. long size 6-32 screws and two nuts.
L362 Dozen....10c Hundred...75c Thousand $6.75

Solder Lugs to Fit Contact Points

Also for connecting wires to binding posts, etc.
L368 Dozen...8c Hundred...50c

SWITCH LEVER STOP

Brass polished nickel finish.
L386 Dozen...35c Hundred..$1.05

BRASS ROD

L961 Threaded 6-32, per 8 in. length. 6c
L963 Threaded 8-32, per 8 in. length. 8c
L965 Solid 3-16 in., per 8 in. length. 5c
L967 Solid ¼ in., per 8 in. length.....9c

COPPER FOIL

L468 Per piece.........................35c
Thin copper foil for shielding panels. 6 inches wide, 2 feet long, .005 in. thick.

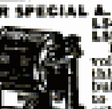
SUPERIOR RHEOSTATS

L147 6 ohms. Each 68c
L148 20 ohms. Each 65c
L149 30 ohms. Each 78c
One of the finest rheostats we have ever seen at a price that makes it the best value obtainable anywhere. Genuine bakelite base. Beautifully shaped black bakelite knob with white arrow. Single hole mounting. A rheostat you will be proud to have in your set.
L156 400 ohm Potentiometer. Matches above rheostats. Each...............89c

FILAMENT CONTROL RHEOSTATS

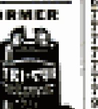
L332 6 ohm. Each 32c
L329 20 ohm. Each 35c
L331 30 ohm. Each 38c
L335 6 ohm Vernier 78c
Best grade. Will give real service. Durable and lasting. High heat resisting base, diam. 2⅛ in. Tapered polished black knob 1⅛" diam. **Potentiometers.** Match above rheostats. Same high grade construction.
L351 200 ohm Ea. 58c L352 400 ohm Ea. 58c

OUR SPECIAL A. F. TRANSFORMER



L549 3 to 1 ratio. $2.25
L550 5 to 1 ratio 2.45
In quality of tone and volume of sound, the things a transformer is built for, we guarantee it to equal or surpass any other transformer. Neat in appearance. Carefully made. Fully mounted with plainly marked binding post connections. Wonderful results on one, two or three stages without distortion or howling. A quality item in every respect.

TRICOIL R. F. TRANSFORMER



L560 For 201A or 301A Tubes..............$2.98
L561 For 199 or 11 or 12 Tubes..............2.98
This transformer will produce wonderful results in any type of regular or reflex radio frequency circuit. Perfect for one, two or three stages. Compact, convenient form, easily mounted. Range 175 to 600 meters.

RADIO "BAKELITE" PANELS

We supply genuine Bakelite, Condensite Celeron or Formica, all of which have practically identical properties. Machines well without chipping. Won't warp. Waterproof. One side has attractive natural polished black finish which can be sanded and oiled. Other side mahogany finish. Either side may be used as front.

Panel Size Inches	⅛" thick		3-16" thick		¼" thick	
	Art. No.	Price	Art. No.	Price	Art. No.	Price
6x7	L450	$.55	L460	$.85	L470	$1.15
6x10½	L451	.86	L461	1.10	L471	1.80
7x10			L455	1.28		
7x12			L456	1.64		
7x14	L458	1.38	L462	1.73	L478	2.35
7x18	L453	1.78	L463	2.27	L473	3.15
7x21	L457	2.05	L467	2.66	L477	4.30
7x24	L459	2.42	L468	2.97		
7x26			L482	3.35		
9x14			L464	2.35	L474	3.15
12x14			L465	2.97	L475	3.98
12x21			L466	4.35	L476	5.76

RUBBER COMPOUND PANELS

Made of a special compound having a rubber base. Equal in appearance and in all essential points to any other class of panels. Fine smooth polished finish. Can be drilled or cut without chipping. Guaranteed not to warp and to be a perfect insulator for radio use. Smooth, clean edges. Thickness 3-16 inch.

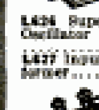
Black		Size Inches	Mahogany	
Art. No.	Price		Art. No.	Price
L481	$.46	7x10	L493	$.75
L482	.77	7x12	L494	.92
L483	.89	7x14	L495	1.09
L484	1.18	7x18	L496	1.34
L485	1.32	7x21	L497	1.55
L486	1.56	7x24	L498	1.75

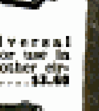
Super-fine Radio Parts

ALL-AMERICAN

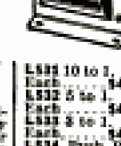
All-American products are known the world over for their high quality. Every item is fully guaranteed to give satisfactory service.

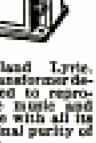
AUDIO FREQUENCY TYPE



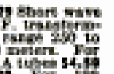


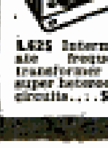
L424 Super Het. Oscillator Coupler....$5.00
L427 Input transformer......$5.40





L428 Universal Coupler. For use in reflex and other circuits..........$3.60





L425 Intermediate frequency transformer for super heterodyne circuits.....$5.40

L535 10 to 1. Each.......$4.25
L532 5 to 1. Each.......$4.25
L533 3 to 1. Each.......$4.05
L534 Push Pull. Pair.......$10.80

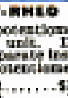
Rauland Lyric. A transformer designed to reproduce music and voice with all its original purity of tone.
L536 Ea...$8.10

L629 Short wave R. F. transformer, range 200 to 550 meters. For 201A tubes $4.50
L630 For 199 tubes only $4.50

HOWARD RHEOSTATS

A well known line of rheostats and potentiometers that is giving very satisfactory service to its users. Complete with knob and pointer.
L211 Plain 85c 6 ohm L212 Vernier $1.25
L213 Plain 85c 25 ohm L214 Vernier 1.25
L215 Plain 85c 40 ohm L216 Vernier 1.25
L218 400 ohm Potentiometer....... 1.49
Single Hole Mounting Type with Dial
L350 Plain 85c 6 ohm L351 Vernier $1.25
L352 Plain 85c 25 ohm L353 Vernier 1.25
L354 Plain 85c 40 ohm L355 Vernier 1.25
L357 400 ohm Potentiometer....... 1.49

BRADLEYSTAT AND BRADLEYOMETER



L208 Bradleystat. Each $1.74
Latest improved type. Can be used with all types of tubes.
Bradleyometer
L209 200 ohm. Each...$1.89
L210 400 ohm. Each...1.89

ACME POT-RHEO

A rheostat and potentiometer combined in one unit. Does the work of two separate instruments. 200 ohm potentiometer.
L217 With 6 ohm rheostat........$2.49
L219 With 30 ohm rheostat........2.49

AMPERITES

Eliminates rheostats on amplifier tubes where adjustment is not critical. Automatically adjust resistance according to flow of current, keeping tubes at proper point for maximum efficiency. Complete with mounting.
L221 For UV201A or 301A tubes.....95c
L222 For UV200 or C300 tubes.......95c
L223 For UV199 or C299 tubes.......95c
L224 For WD11 or C11 tubes.........95c
L595 Erla Selectoformer..........$4.45
L740 Erla Crystal Detector....... .89

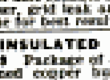
OTHER STANDARD BRAND AUDIO FREQUENCY TRANSFORMERS

Fresh, Clean Stock in Original Containers.
L587 Thordarson Ratio 3½ to 1....$3.30
L588 Thordarson Ratio 6 to 1.......3.70
L589 Thordarson Ratio 2 to 1.......3.95
L590 Thordarson Push Pull. Pair...11.70
L553 Acme..........................3.95
L557 Erla 6 to 1...................4.05
L558 Erla 3½ to 1..................3.69
L591 Modern 10 to 1. Each..........4.30
L592 Modern Push Pull. Pair........9.90
L555 Federal No. 226. Each.........4.45
L556 Federal No. 65. Each..........6.55
L712 Radio Corp. Each..............5.70

STANDARD BRAND RADIO FREQUENCY TRANSFORMERS

L562 Dubilier Duratran..............$4.45
L565 Acme R2........................3.95
L566 Acme R3........................3.95
L567 Acme R4........................3.95
L568 Erla Reflex No. 1..............4.45
L579 Erla Reflex No. 2..............4.45

RESISTANCE COUPLED AMPLIFICATION



L570 1st Stage Unit $2.30
L571 2nd Stage Unit 2.30
L572 3rd Stage Unit 2.30
Amplifies without distortion. Replaces audio frequency transformers using same circuit. Each unit consists of a mounting with condenser, grid leak and resistance of proper value for best results.

INSULATED BUS BAR WIRE

L959 Package of 5 30-inch pieces...49c
Tinned copper bus wire insulated with highest grade varnished covering. 5 pieces, one each color—yellow, brown, black, green and red. Using different colors makes tracing of circuits easy and sure, neater and lower cost.

SCREW ASSORTMENT

L960 100 pieces screws and nuts.....35c
Contains screws and nuts of size and style needed for assembling any radio set.

COMPOSITION DIALS

Handsome dials moulded in one piece of polished composition. 2 inch size has 270° scale marked 0 to 100 finely engraved in contrasting white enamel. 3 and 4 inch size have 180° scale marked 0 to 100.

Black		Diam.	Shaft Size	Mahogany	
No.	Price			No.	Price
L921	14c	2"	3-16	L926	19c
L922	16c	2"	¼	L927	19c
L923	22c	3"	3-16	L928	26c
L924	22c	3"	¼	L929	26c
L925	27c	4"	¼	L930	32c

GENUINE BAKELITE DIALS

L931 2 in. Diam. for 3-16 in. shaft....35c
L932 2 in. Diam. for ¼ in. shaft.....35c
L933 3 in. Diam. for 3-16 in. shaft...39c
L934 3 in. Diam. for ¼ in. shaft......39c
L935 4 in. Diam. for ¼ in. shaft. Ea. 48c
Moulded in one piece of genuine bakelite in polished black finish. Finely engraved scale in contrasting white enamel. Sure grip knob that fits the fingers. Higher grade dials for good sets. Match perfectly.

VERNIER DIAL ADJUSTER

L941 Each..............54c
Easily installed at edge of dial, gives finest Vernier adjustment of condenser or inductance. A great value. Polished black knob.

SUPERIOR VERNIER ADJUSTER

L942 Each...........26c
Polished black knob. "Vernier" engraved in white. Spring adjustment. Need not be disassembled for mounting. Easily installed.

UNIVERNIER CONTROL DIAL

L918 For 3-16 in. shaft, silver dial, black knob.......$1.10
L919 For ¼ in. shaft, silver dial, black knob.......$1.10
L916 Gold dial, mahogany knob for ¼ in. shaft. Each $1.25
Replaces ordinary knob or dial.
Gives perfect vernier control on condenser, variometer, variocoupler, tickler, etc. Positive easy action—Looks fine. Easily installed. Especially desirable in tuning neutrodyne sets.

ACCURATUNE CONTROL DIAL

L914 Clockwise $3.20
L915 Counterclockwise..........$3.20
Has four inch silver finished dial with black knob. 80 to 1 ratio give finest tuning adjustment.

BEZELS

Finest quality. Fit any thickness panel.

Size In.	Nickel		Black		Gold	
	No.	Price	No.	Price	No.	Price
⅝	L904	15c	L907	16c	L910	28c
1	L905	15c	L908	16c	L911	28c
1½	L906	15c	L909	16c	L912	28c

PANEL ENGRAVINGS

L937 Per Set.............................19c
A complete set of transfers in neat white lettering for marking connections, dials, etc. Easily applied in a few seconds. Look like real machine engravings, contrasts neatly on black or mahogany panels. Plenty of titles for the largest set.

The Barawik Co.
102 So. Canal St. Chicago, Ill.

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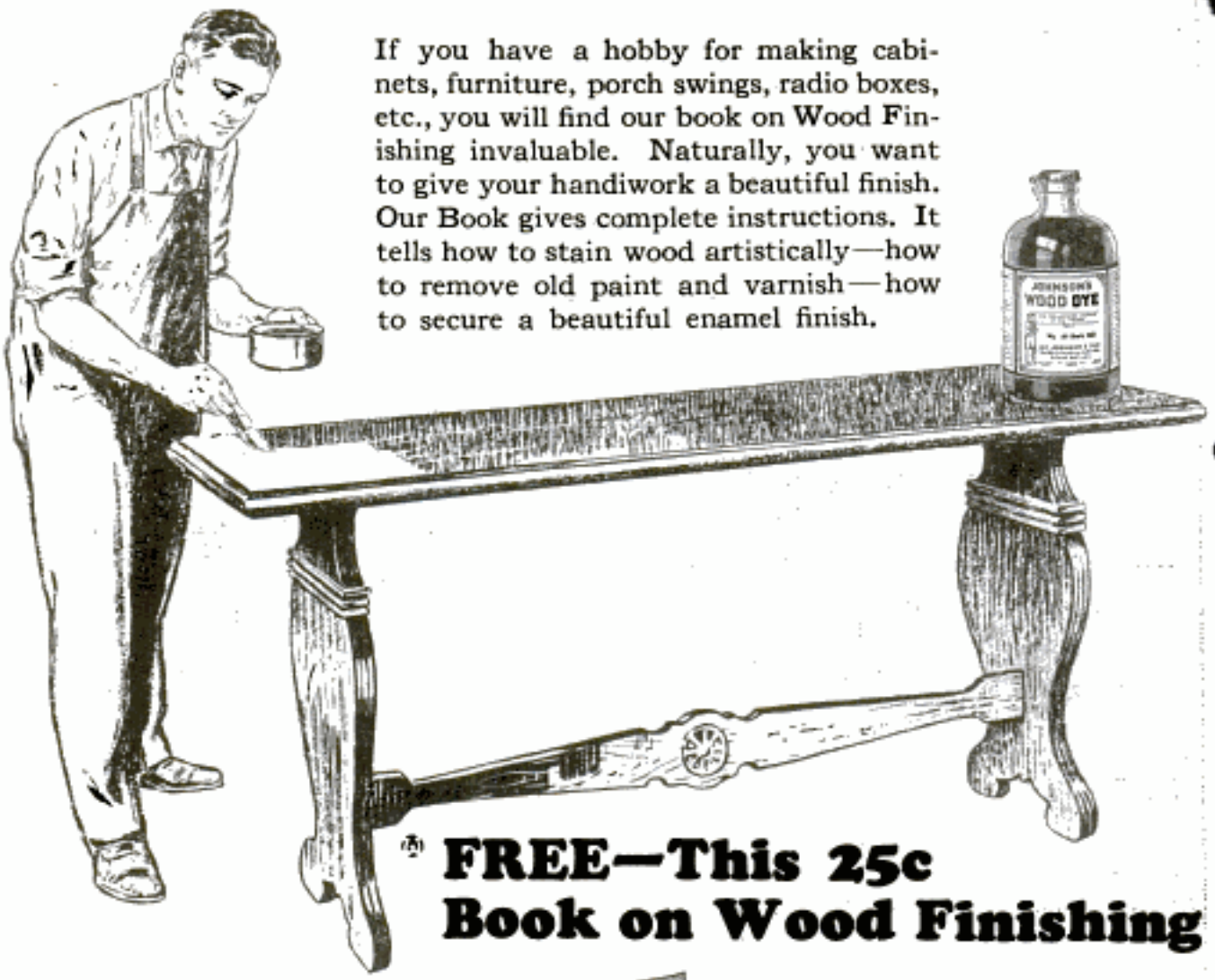
How to Finish Home-Made Furnitur



If you have a hobby for making cabinets, furniture, porch swings, radio boxes, etc., you will find our book on Wood Finishing invaluable. Naturally, you want to give your handiwork a beautiful finish. Our Book gives complete instructions. It tells how to stain wood artistically—how to remove old paint and varnish—how to secure a beautiful enamel finish.

FREE—This 25c Book on Wood Finishing

This Book gives complete instructions for finishing all wood—hard or soft, old or new. Explains just what materials to use and how to apply them. This book is the work of experts—illustrated in color. Contains a hundred wood finishing hints.

Tells how inexpensive soft woods may be finished so they are as beautiful and artistic as hardwood. Includes color charts—gives covering capacities, etc. Contains practical suggestions on making your home artistic, cheery and inviting.

Johnson's Wood Dye

(Penetrating)

S. C. JOHNSON & SON, Dept. P.A.1, RACINE, WIS.
"The Wood Finishing Authorities"
(Canadian Factory—Brantford)

Please send me free your 25c Instruction Book on Home Beautifying and Wood Finishing. I enclose 10c to cover postage and wrapping.

MY DEALER IS.....

My Name.....

Address.....

City and State.....

SERVICE DEPARTMENT
JOHNSON'S ARTISTIC WOOD FINISHES

Johnson's Wood Dye is for the artistic coloring of all wood. It is very easy to apply—dries in four hours and will not rub off or smudge—penetrates deeply, bringing out the beauty of the grain. Made in 17 beautiful shades, among the most popular of which are:

123—Dark Oak	*131—Walnut*
129—Dark Mahogany	*126—Light Oak*
127—Brown Mahogany	*124—Golden Oak*

Order Johnson's Wood Dye from your dealer by name and number.

S. C. JOHNSON & SON, RACINE, WIS.
"The Wood Finishing Authorities"

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Unsurpassed selectivity, sensitivity, range, volume and tone combined

Looks like—and performs like—a $200 radio set

BUILT TO GIVE LOUD SPEAKER ENTERTAINMENT FROM STATIONS THOUSANDS OF MILES DISTANT WHILE LOCAL STATIONS ARE BROADCASTING

Can be used as a 2-tube, 3-tube, 4-tube or 5-tube set!

"Coast to Coast" reception *verified by Miraco Users*

Every Miraco user is an enthusiastic booster—these letters are typical of the many we receive.

Miraco "Shows" Missouri

I bought one of your radios last summery and like it fine. Have picked up stations from Coast to Coast and from Canada to Cuba. My motto with the Miraco is: "What's the use to pay more when the Miraco will reach as far as you can understand the language?" —George V. Scott, Moberly, Mo.

N. Y. Hears England & Brazil

Am very glad I bought a Miraco as it works the best of any I have heard. All the people who come to listen say that when they buy a set it will be a Miraco. Have heard London, England, and Rio de Janeiro, Brazil, with my Miraco. It sure works fine. It is the best set on the market for the price.—Leo Link, Marcy, N. Y.

Pennsylvania Hears Calif.

The Miraco is a real "Coast to Coast" set. Last night I tuned in on KGO, Oakland, Cal., WFAA, Dallas, Texas, KFKX, Hastings, Neb., besides fifteen other stations. Have received 55 in all. It is a wonderful set for the price.—Earl C. Way, Coleman, Pa.

Iowa Hears N. Y. to Calif.

Have heard from New York to California on my Miraco. All who have heard it think it fine. —Chauncey Bailey, Stockport, Iowa.

Beats Some $300 Sets

The Miraco that I bought last fall is giving better satisfaction than some $300 sets others have here.—Otis Morris, Warren, Idaho.

Nebraska Hears Cuba

Miraco sure is a go getter. I get better reception than anyone in this neighborhood. Had WSAI, Cincinnati, on loud speaker in July—pretty good for warm weather. I tuned in KGO, Oakland, Cal., and WBZ, Springfield, Mass., and have heard PWX, Havana, Cuba, a number of times.—Verne J. Gustason, Blair, Nebr.

"Hears the Scotch"

I am proud of my Miraco. Have had Cuba, Canada, Glasgow, Scotland—of which any one should be proud—with nearly every station in the U. S.—Parke A. Neet, Catlin, Ind.

The Marvelous MIRACO Ultra 5 — costs only $75

[FIVE TUBE OUTFIT IN BEAUTIFUL SOLID MAHOGANY CASE]

Send for free bulletins and SPECIAL OFFER today!

Completely built, thoroughly tested and factory guaranteed **by one of America's oldest and most reliable manufacturers of quality sets!** Years of experience and quantity production explain its almost incredible price. Users say that friends **who see and hear it** are amazed that it sells for less than $150 or $200. Radio experts, who **know** good construction and quality parts, are equally astonished. You, too, will be delighted, thrilled, amazed with your big five-tube Miraco **Ultra** 5 in its beautiful hand-rubbed **solid mahogany** cabinet!

Imagine getting all this for $75—a beautiful sweet toned "coast to coast loud speaker" set, composed of finest parts, equipped with the latest improvements, refinements and features found on costliest sets. An instrument approved by radio's highest authorities! A set anyone can connect and operate. Even beginners learn quickly to cut through the "locals," get distant stations loud and clear, log stations and return to them at will. (Full directions with each set.) It is non-radiating, non-distorting, non-howling. Has cut-out switch—and a first stage phone jack for tuning—on Bakelite panel. All wiring concealed under Bakelite sub-base. Works on storage battery or dry cells. Literature describes other newest features.

Other Miraco Long Distance Sets $14.35 up

Miraco Model R justly deserves its title, "Radio's finest low priced quality receiver." One tube acts as a tuned radio frequency amplifier and detector combined. A great distance getter. Easy to operate and log. Covers all wave lengths 150 to 625 meters. Like all Miraco sets, it operates on a storage battery or dry cells. Never such value before at only **$14.35. Send coupon today!**

This wonderful new Miraco Model R-3 is the three-tube, long distance, loud speaker set that has created such a sensation. Easy to tune and log. Covers wave lengths 150 to 625 meters. Detector acts also as a tuned radio frequency amplifier. 2 stages audio frequency amplification. Has no equal for simplicity, volume, range or clearness at anywhere near its price of **$29.50. Use coupon!**

All the Proof you want is waiting for You!

Reports from the many users in every state prove Miraco Tuned Radio Frequency Receivers—at rock bottom prices—have efficiency of sets costing up to three times as much. Remember that Miraco Sets are the product of a long established, reputable manufacturer—pioneer builders of sets. Send for further evidence that they are Radio's finest moderately priced receivers. All Miraco sets bear the endorsement of radio's highest authorities. Mail coupon now for latest bulletins, SPECIAL OFFER and plenty of additional testimony from users leaving no doubt that "Miraco Radio Gets 'em Coast to Coast."

Dealers! Jobbers!

Write for the new Miraco proposition.

Agents!

The wonderful tone, volume and distance-getting ability of Miraco Sets makes them easy to sell. Send coupon for proposition; good territory open.

Send coupon for free bulletins [or order direct from this ad]

MIDWEST RADIO CORPORATION
Pioneer Builders of Sets, 407-K E. Eighth St., Cincinnati, O.

Send free literature, SPECIAL OFFER and all particulars regarding Miraco Sets. ( ) Jobber ( ) Dealer ( ) Agent ( ) User

NAME.....

ADDRESS.....

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FREE Tapestry Table Scarf

This beautiful, richly colored, large size 50x14-in. Tapestry Table Scarf comes to you absolutely FREE with Library Set. It is prettily edged all around with fancy mercerized cotton. Accept this handsome Scarf as a gift from Hartman with the Library Set. Pay nothing for it at any time. Send today. Offer is good for limited time only.

IMPORTANT! Do not confuse this splendid, sturdy Library Set with ordinary, cheaply constructed sets. Read below the features of its superior, lasting construction.

NO MONEY DOWN

No C.O.D.—Nothing to Pay for Library Set on Arrival

Just mail the coupon and **Hartman, the Largest Home Furnishing Concern in the World,** will send you this 7-Piece set of handsome Library Furniture, and with it, absolutely **FREE the beautiful Tapestry Table Scarf** pictured above. Nothing to pay for goods on arrival. No C.O.D. *30 days' Free Trial.* If not satisfied, send everything back and we pay transportation charges both ways. If you keep them, **pay only for the library set—a little every month.** The Scarf is FREE.

7-Piece Library Set

Quarter-Sawed and Solid Oak—Fumed Finish

Seven splendid pieces—42-inch x 26-inch Table; Arm Chair; Arm Rocker; Straight Chair; Sewing Rocker; Tabourette and Book Ends. All full size and of seasoned solid oak in popular fumed finish, Mission style. Arms of rocker and arm chair genuine quarter-sawed oak. Chairs and table have domes of silence. Seats and backs upholstered in heavy, imitation Spanish brown leather. Seats are auto type with hand-tied coil springs, resting on steel bands—cannot sag. A wonderful set of furniture at an unparalleled bargain price.

Send Post Card Today for Your FREE Copy

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Most complete book of its kind ever issued. Over 300 pages (of which 68 pages are in actual colors) of the world's greatest bargains in **Furniture,** rugs, carpets, draperies, aluminumware, sewing machines, silverware, watches, etc. **30 days' free trial. Easy monthly terms** on everything you buy. **Opening an account with us is like opening a charge account at your local store, but you have nearly a year to pay at Hartman's. Send Post Card Only for Catalog No. E6969**

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Book also explains about Hartman's wonderful gift plan which brings you, absolutely Free with purchases, many splendid articles, such as glassware, dishes, silverware, toilet sets, jewelry, table linens, etc.

"Let Hartman Feather YOUR Nest"

FREE HANDSOME TAPESTRY TableScarf

Scarf sent FREE with order for Library Set. Made of richly colored tapestry, size 50x14 in. Has a finished edge all around of mercerized cotton. Don't miss this amazing bargain. Furnish your home with this elegant library set. Take nearly a year to pay—and get the Tapestry Scarf FREE.

Use Coupon Only When Ordering the Library Set—Mail Today!

Hartman Furniture & Carpet Co.
Dept. 6969 **Chicago, Illinois**

Send the

7-Pc. Library Set No. 110FFMA20, Price $49.95,

as described, and with it the Tapestry Table Scarf, absolutely FREE. I am to pay nothing for the goods on arrival—only the freight charges. I am to have 30 days' free trial. If satisfied, I will send you $4.50 monthly until full price of the Library Set, $49.95, is paid. Will pay nothing at any time for the Table Scarf. Title remains with you until paid in full. If not satisfied after 30 days' free trial, I will ship all the goods back and you will pay transportation charges both ways.

Name.....

R. F. D., Box No.
or Street and No. .....

Town..... State.....

Order by No. 110FFMA20. Bargain Price of 7-Piece Library Set, $49.95. No Money Down. $4.50 Monthly. Table Scarf is FREE.

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